

BULLETIN OF MISCELLANEOUS INFORMATION No. 4 1933 ROYAL BOTANIC GARDENS, KEW

XX—SARRACENIA PURPUREA VAR. STOLONIFERA.

A NOTEWORTHY MORPHOLOGICAL AND ECOLOGICAL TYPE.

JOHN M. MACFARLANE AND D. WALTER STECKBECK.

DESCRIPTION OF LOCALITY.

In response to a request by the late Dr. Maxwell Masters, the senior author published a short paper in the "Gardeners' Chronicle" for 1895 (series 3, xvii. 643) entitled "Sarracenias at Home." The article mainly treated of an excursion into the Southern United States undertaken, along with one of his students, nearly a year before, chiefly for field study of the native pitcher plants or Sarracenias. In a few concluding sentences the author wrote as follows: "You will scarcely credit the show that our native *S. purpurea* at times makes. About three weeks after my southern tour I was botanizing in New Jersey, and was carried by train past a lake bordered by the plants. I determined to make an inspection and did not regret it. The lake was about a quarter of a mile long. Its margin was covered by a continuous sheet of large specimens mostly of deep crimson hue.

"To look down on a piled up mass of pitchers, seven to twelve feet in width and mostly floating on the water, was a sight indeed. I hope some day to photograph the view and you will then be able to share the pleasure.

"In the sheltered bays of this lake floating beds of the purple bladderwort (*Utricularia purpurea*) in full bloom, alternated with sunken logs that were carpeted with *Drosera rotundifolia* and *D. intermedia*. A real carnivorous garden you will say and such it was."

Many readers of the above, who are familiar with *S. purpurea* in its native haunts, may incline to query the possible correctness of such a description. For in the numerous and extensive expeditions made by the senior author of this article during the past forty-one years, from eastern Canada and Maine south to northern Florida and the coast of Louisiana, he has encountered no locality which would compare with that now to be described, nor any growths of pitchers and of stems comparable in size to those now figured.

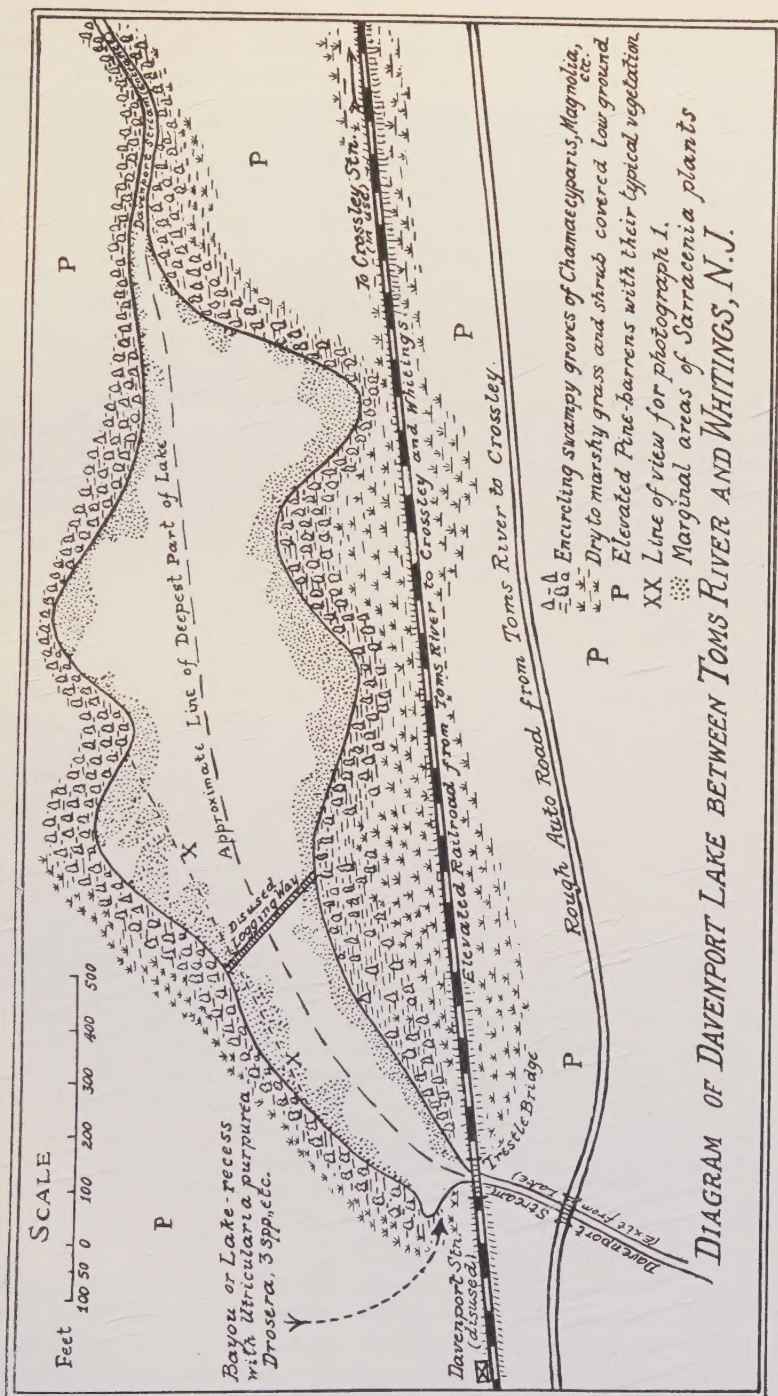
First acquaintance was made with the locality in mid July 1894, when the senior author along with one of his little sons—then four years old—was rapidly carried by train along the railroad embankment that rose about ten feet above the edge of the pond or lake.

His eye quickly and with delight took in the scene, while the exclamation came from the small boy at his side " Oh, Papa, see the *Sarracenia* ! " For, over almost the entire shore margin that stretched away obliquely for about a quarter of a mile from the point of view, dense growths of *Sarracenia purpurea* extended. These varied in colour from rich crimson in sunny places to greenish-crimson or almost green in the shade, while their large pitchers bordered the shore often in continuous masses to a width of from two to frequently ten or even twelve feet. They produced a beautiful colour effect against the sparkling water and the tall cedar woods beyond, which anchored their roots among those of the *Sarracenia*s. The timetable indicated that a " flag station," Davenport, had just been passed, and that Whitings was five and a quarter miles ahead in the direction of Camden and Philadelphia.

Needless to say, the writer resolved to visit so attractive a locality and to explore its riches. This was done about three weeks later when staying at Island Heights, a village about three miles east from Toms River. Around the lake on every side stretched undulating, sandy expanses of typical pine barrens soil on which grew a flora eminently characteristic of that region. This will be described later by the second author. But, looking westward along the railroad for about three hundred yards, the desired locality seemed to be in view, for both sides of the track were bordered by tall growths of the white swamp cedar or cypress (*Chamaecyparis thyoides* or *C. sphaeroidea*) which suggested swamp or even lake expanses. On nearer approach it was found that the railway had been carried over a bridge, beneath which flowed a stream whose waters were of the typical pine barrens yellow-brown tint.

The stream issued from a pond or small lake on the left, which, after the bridge was crossed, gradually came into full view as an obliquely extended expanse of water. This was almost wholly encircled by tall growths of the white cedar whose trunks grew in the shallow water or in the shaded bordering sphagnum margin. This shaded area reached from ten to fifteen feet from the edge of the pond. A wide recess or bay had formed for about twenty feet to the left of the outlet, and here a striking scene was visible from our high vantage ground on the railroad. A few snags had drifted down and accumulated over the waters of this bay, in part submerged, in part exposed. These had entangled great beds of the purple bladderwort (*Utricularia purpurea*), whose floating masses formed a sheet of lavender-purple bloom. Along the moist sides of the logs or spreading over the sandy bay-shore were abundant patches of *Drosera rotundifolia* and *D. intermedia*.

As the sketch-plan indicates, the lake, fully a third of a mile long, was of irregular and sinuous outline, its median line being a curve that extended from the out-flowing stream upward to where the lake again contracted into a gently moving and largely sphagnum-bestrewn current continuing for miles to the westward.



From a study of the entire lake, as well as of its inlet and outlet areas, its history was evidently somewhat as follows. Originally a small continuous stream that arose in the higher moist lands near Whitings, it flowed for about two miles in a south-easterly direction, then turned north-eastward for nearly nine miles as Davenport Branch when it joined two lesser streams, Wrangel Branch and Sunken Branch. These together formed a somewhat enlarged pond which in turn narrowed into a stream emptying into the Toms River at the county seat of that name.

Many years ago, however, the Pennsylvania Railroad was first cut through, and continued from Whitings to Toms River and onward. In the process a railroad embankment was formed that cut across the depression in the midst of which Davenport Branch flowed. In constructing the embankment a trestle bridge about fifteen feet long was built across the actual stream. During spring freshets this embankment formed a slight temporary dam and restricted the flood water to the one outlet channel, which in the course of time was excavated so as to produce a pond that steadily increased in width and depth. Into this expanding lake, under normal enviroinal conditions, a gentle precipitation of decomposing animal and vegetable remains was carried downward. These remains together with the inorganic mud gave rise to a fine, silty deposit or muck over the sandy lake floor. This evidently formed an exceptionally rich and loose soil in which plants of *Sarracenia* could readily root while the protruding pitchers above could capture an ample supply of insects.

Such clearly must have been the conditions which favoured an abundant growth of luxuriant *Sarracenia* plants. The soft, silty muck now varies in depth from three to twelve inches along the shore line, to as much as two or three feet in deeper water. The deepest parts of the lake, along its median curved line, are from four to six feet deep.

At the time of the first visit in 1894 many of the white cedars were tall, thick trees which, along with those of lesser growth, formed an imposing cincture to the pond margin. About ten years later, however, the larger trees were cut out, and this seemed to admit abundant sunlight which gave crimson colour to the pitcher plants beneath, as well as to those farther out in the open. The surface of the pond margin that had been invaded by the *Sarracenias* was on an average three feet in width, but in places as much as ten to twelve feet. So solidly were the plants grown together, and so closely rooted amid the sphagnum and silty mud, that one inclined almost to step out amongst them as if on firm ground.

Mention has been made of the varying colour of the leaves of the *Sarracenia* plants. These showed a transition from uniform green in the deeper shade of the cedars, swamp magnolias and swamp blueberries, to a dark crimson-purple hue over the entire surface of the pitcher where fully exposed to strong sunlight. A similar

PLATE X

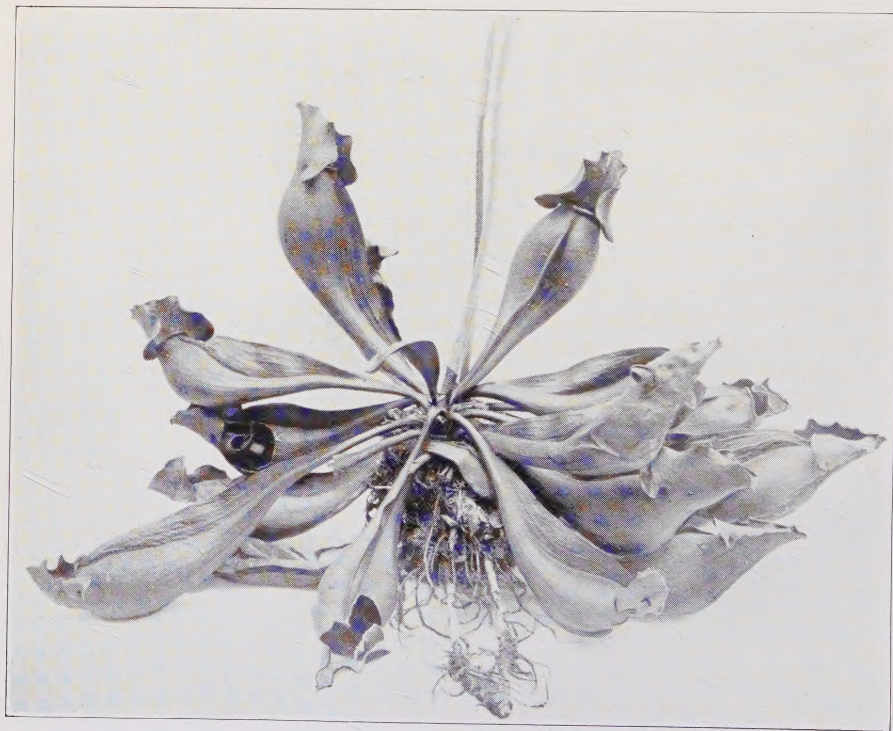


1. Masses of *Sarracenia purpurea* var. *stolonifera*, from 3 ft. to 12 ft. wide. Photograph taken along line xx in sketch-map.

PLATE XI



2. General view of widest part of lake.



3. Single plant of *Sarracenia purpurea* var. *stolonifera* (greatly reduced) in late May, showing 7 new leaves of the current year surmounting 7 still fresh or slightly withered leaves of previous season, and a few withered remnants of still older leaves. Widest diameter of plant from pitcher tip to pitcher tip 29 ins.

variability is observable also from northern Maine southward to northern Florida, or for a distance of 1300 miles, and is equally characteristic for such southern species as *S. Drummondii* and *S. psittacina*. The colour of the upper leaf surface in Venus' flytrap and the tint of the tentacular hairs in leaves of the native sundews vary in the same way.

When seen at this time (August) the plants showed thousands of strong, upright fruiting stalks, rising conspicuously above the dense masses of pitchers which made up each huge patch. The stalks varied in height from 14 to 19 ins. and in thickness from $\frac{1}{8}$ to $\frac{1}{4}$ in. Occasionally withered remnants of the petals could be traced, but the five large spreading and persistent green to purplish sepals were conspicuous, surrounding the large maturing fruit. While not a few of the fruits were maturing normally or had recently burst their carpels, many showed the serious havoc caused by the depredations of the larval stage of *Exyra Rolandiana*. This small moth attacks the carpels and soft young seeds, feeding on them and so reducing their tissues to a pulpy condition. They unquestionably cause great destruction to, and reduction of, the total quantity of seeds matured. This subject has been very thoroughly investigated by Dr. Frank M. Jones in a series of valuable papers* which have been published during the past few years.

At irregularly succeeding periods, the senior author conducted various excursions with his students and with members of scientific societies to the region. He therefore had opportunities for studying the area and its local flora. Several of these observers have secured photographs illustrating both the plants and their surroundings. Special mention should be made of the views secured by Dr. Herbert Kribs, by Dr. Walter Steckbeck the junior author of this paper, and by Dr. W. Randolph Taylor. The first of these observers obtained some pictures of great detail and to him the present authors are grateful for permission to have one of them reproduced.

Comparative study, then, throughout these years has shown that the plants of this limited area deserve to be regarded as a distinct variety. They differ strikingly in many structural details from the normal form, *S. purpurea* var. *typica* (Macfarl. in Pflanzenreich, Sarraceniaceae, 33). Accordingly specimens have been deposited in the Kew Herbarium, in that of the University of Pennsylvania and in various other herbaria of America and Europe.

The following is a description of this variety.

***S. purpurea*, var *stolonifera* Macfarl. et Steckb.**

Rhizoma elongatum usque ad 51 cm. longum, incrementa annua 1.25-3.2 cm. longa formans, ramulos laterales spatiis interiectis gerens rhizomati parenti similes atque interiectis 5-8 annis putrefacti ab eo separantes. *Ascidia* 10-45 cm. longa, parte tertia inferiore solida, partibus duabus superioribus cavis; ala usque ad 2.5 cm.

*The most important of these appeared in Natural History, xxi. no. 3, 296-316 (1921).

lata; os 1.5-2.8 cm. diametro; pedunculis elongatus usque ad 47.5 cm. longus. *Flos* quam in var. *typica* tertia parte vel dimidio major.

PERIOD OF BLOOMING.

During the last thirteen years observations have been made by the junior author on the blooming periods of this plant at Davenport and Crossley. Some sixteen trips were taken to the region; most of these were made in the latter part of May when the pitcher-plant is in various stages of flowering, and when many other plants of the pine-barrens are at their climax of blooming.

The results of these studies indicate that the average climax of flower expansion, that is when practically all flowers in a given area are fully open, is about May 28th. The earliest season was that of 1921 when spring in this latitude was unusually early. By May 21st of that year *Sarracenia* was past its best for flowering. The latest of the twelve seasons was that of 1924 when on May 31st barely $\frac{1}{3}$ of the flowers had lengthened their petals. The spring of 1928 was about as late as that of 1924, and the climax of blooming was delayed to June 4th.

Flower buds are noted on the *Sarracenia* plants early in May or even late in April. Gradually the stout pedicels elongate, the buds swell, and in an early season one may look for the first open flowers shortly after the middle of May, but the beginning of flower-opening obviously depends on the seasonal conditions. After complete expansion of the purplish-red petals, a period of six to nine days elapses before the showy corolla withers and drops, its work in attracting insect visitors having been accomplished. With the petals go the numerous stamens, and even in late seasons by June 15th only persistent bracts, sepals and pistil remain, the last consisting of developing ovary, the elongated lower half and the umbrella-like upper half of the style that bears five small stigmas between the tips of its pentagonal lobes.

ENVIRONMENTAL PLANT ASSOCIATES.

While *Sarracenia* holds first place in importance for the visitor to Crossley during May, yet a considerable number of other plants then in bloom adds to the interest. Along the water's edge one finds lingering clusters of *Orontium aquaticum*. Somewhat out from the banks of the stream *Eriocaulon* is just opening its capitula of flowers. One of the showiest pine-barrens companions of the pitcher plant is *Xerophyllum asphodeloides*, sending up long racemes of numerous flowers. At this time one may look for such other plants in bloom as *Arethusa bulbosa*, *Cypripedium acaule*, *Leucothoë racemosa*, *Leiophyllum* (*Ledum*) *buxifolium*, with flowers well past their climax, *Arctostaphylos Uva-ursi*, in full bloom a month earlier but at times showing a lingering flower, *Euphorbia Ipecacuanhae*, *Hudsonia ericoides*, *Pyxidanthera barbulata*, nearly over, *Pyrus arbutifolia*, *Helianthemum canadense*, *Linaria canadensis*, *Arenaria caroliniana*, in large bud and well on to full bloom before *Sarracenia* passes,

species of *Vaccinium* and *Gaylussacia*, *Kalmia latifolia* and *K. angustifolia*, both in large bud or just opened, etc. Of special interest are the three species of *Drosera*—*D. rotundifolia*, *D. intermedia*, and *D. filiformis*—all very common but blooming after the pitcher plants.

ANATOMY OF THE RHIZOME.

A study and comparison of numerous sections of rhizomes of different ages and varying sizes indicate a relatively simple anatomy. In common with rhizomes of many other species of plants, one of the main functions of this type is storage of reserve foods. In the present variety of *Sarracenia* starch is stored in abundance in large cortical and pith areas. Another prominent anatomical feature is the presence of aerenchyma in the cortex and to a lesser degree in the pith.

The young rhizome shows four main areas, the epidermis, cortex, vascular bundles and pith. The epidermal cells are small and scarcely larger than, or different in shape from, the small cells of the exocortex, but the former are thicker-walled than the latter. The epidermal cells are slightly cutinized over their outer walls and prominently lignified along their inner walls. These cells soon become brownish in content, and later fragment off irregularly, so as to leave the outer cortex as the surface layer. The wide cortex has many large lacunae, constituting the aerating tissue that is so common in submerged plant parts. Practically every cell of the cortex shows an abundance of stored starch, as do the cells of the pith.

The bundles are arranged in a circle that is broken by the fairly wide medullary rays. The individual bundle is open, collateral and consists of a small area of phloem, a poorly-differentiated cambium and a well defined xylem. Protoxylem is but faintly indicated. The pericycle of the young stem can be traced only by the presence of very small groups of bast fibres bounding the bundles. The pith is continuous and, as indicated above, closely resembles the cortex in structure and in function.

In comparison the older and larger rhizomes present changes in the anatomy of the different tissues. Increase in width of the areas, and so in the diameter of the stem, is noted in cortex, vascular bundles and pith. Quite frequently the epidermis has sloughed off. The outer cortex becomes more and more lignified as development continues. No cork is formed, as tests for suberin give negative results.

The bundles show radial and lateral increase in size but not so pronounced as is the increase in cortex, and to a lesser degree in pith. In no instance can any indication of annual rings in the xylem be observed, even though the oldest stems examined were at least twelve to fifteen years old, as determined by several external features. A greater degree of lignification in the wood fibres is seen as the stem becomes older. Very few wood-parenchyma cells,

containing small starch grains, are scattered through the xylem areas.

The relative insignificance of mechanical tissues at all stages of growth in the stem is noteworthy. The comparatively small amount of bast fibres, derived from the pericycle, and the equally small amount of wood fibre constitute the supporting system; for the rhizome, supported as it is by the surrounding water, needs little mechanical strengthening.

The absence of annual rings in the xylem, as noted before, may be explained by the fact that growth of vascular tissues is more or less continuous throughout the year, while persistence of the leaves through the winter and up till June of the succeeding season should be noted in this connection. The temperature below the surface of the water probably does not drop low enough to stop growth entirely.

DESTRUCTION OF PLANTS.

It seems appropriate that attention should here be drawn to a regrettable occurrence which in May 1931 came to the notice of both writers. On reaching the Crossley locality they were surprised to discover that along the northern margin of the lake great destruction and removal of almost the entire crop of pitchers of the previous season had taken place. On passing later to the farther or south side of the lake a sad condition was revealed. For, at three different centres, piles of dead pitchers of the last year's growth were heaped high on the bank a few feet from the shore. These were in a withered and nearly dry state and, when turned over, revealed great masses of still fresh or half decayed pitchers beneath. Closer examination of this south shore showed that by aid of grappling irons, some of which had been left behind, a wholesale destruction of the plants had been effected; some had been left in the above withering state, while others had evidently been carried away in heaps.

The present authors have since learned that this act of wanton destruction had been carried out with the object of securing material for pharmaceutical investigation into the chemical and physiological properties of the plant. Considerable study has already been conducted, from the time of Dr. Porcher onward, along this line with fairly definite results. It is highly regrettable therefore that needless destruction should have been effected in so interesting a locality and on a variety of the species so remarkable alike in size and mode of growth.

The senior writer has tried on several occasions during the past thirty years to interest different organizations in the project of purchasing the locality as a sanctuary that surely should be secured inviolate for future generations. As yet these efforts have proved wholly fruitless.

AFFINITIES OF THE SARRACENIACEAE.

The senior author now desires to refer to a paper published by him in 1893 under the title "Observations on Pitchered Insectivorous

Plants" (Annals of Botany, vii. 440: 1893). He observes, "I have already stated that the Sarraceniaceae show many points of affinity in flower-structure with the Nepenthaceae." He then compares the morphological details of the two families side by side, and makes the following remarks: "The agreement of the above characters establishes not a mere analogy, or remote relationship between two orders [families], as botanists have hitherto supposed, but gives to all the genera a common ordinal [family] value; for the herbaceous or semi-shrubby mode of growth, presence or absence of tracheids in the tissues and of petals in the flowers, the distinct or fused stamens, and other points of difference, are not sufficient, and have not been made sufficient by systematists hitherto, for the separation of genera that otherwise show decided affinities. The following condensed description would enable us to diagnose readily from all others a family which might appropriately be termed the [Nepenthaceae or] Ascidiaceae:—

"Glandular herbs or under-shrubs, inhabiting swamps and wet places; . . . leaves with or without flattened lamina, sometimes tendriform, ascidiform, and adapted for insect-catching; flowers regular, solitary, or racemose, hermaphrodite or dioecious, entomophilous; sepals, five, four or three, green or coloured, hypogynous; petals, five, four or absent, greenish or coloured when present; stamens indefinite (rarely definite), hypogynous, free or connate into a tube, anthers two-celled; pistil syncarpous, of five, four or three carpels, with central (axile) placentation; ovules anatropous, horizontal or ascending; styles short, with truncate flattened or expanded extremity, bearing five, four or three stigmatic lobes; fruit a capsule, surrounded by the persistent calyx and dehiscing loculicidally into five, four or three lobes when ripe; seeds small, ovoid, elongate-appendiculate or winged, testa crustaceous or loosely reticulate; albumen fleshy; embryo straight in the albumen."

Whether the above suggestions be accepted or not, the writer would definitely affirm that all fundamental facts of structure, of morphological affinity and of geographic distribution clearly indicate a continuity in time relationship among these genera and species that is as intimate as it is suggestive. For the elongated and lignified stem of *S. purpurea* var. *stolonifera* that bears occasional lateral shoots, the persistence of it for from ten to twenty years at least, the elongated annual growths that show distinct internodes, the deeply sheathing leaf bases, the separation of each leaf into a petiolar, lower, solid half and a laminar, upper, ascidiform half, the development of alluring, attractive, conducting, and detentive surfaces that ensure the capture of insects are not merely morphologically similar or analogous but constitute identities or homologues. When one adds to the above that *Heliamphora* of northern South America and *Darlingtonia* of California and Oregon, represent connecting links in the above chain of identities, the close agreement is greatly strengthened.

XXI—NEW TREES AND SHRUBS FROM TROPICAL AFRICA: II.* A. C. HOYLE & H. DUNKLEY.

Triumfetta palmatiloba Dunkley, sp. nov. [Tiliaceae]; affinis *T. digitatae* Sprague et Hutch. a qua petiolis valde longioribus foliis paullum ultra medium 5-lobatis nunquam 7-lobatis staminibus paucioribus, ovario 3-loculare recedit.

Frutex erectus, ramulis crassis cum petiolis et inflorescentia scabrido-stellato-pustulatis, perulis subulatis setoso-ciliatis. *Folia* paullum ultra medium palmatiloba, basi late cordata vel truncata, lobis oblongis acutis irregulariter serratis, supra sparse pilis stellatis adpressis scabrida, subtus minute incano-stellato-tomentella, nervis venisque elevatis ferrugineo-stellato-pubescentibus; petioli 5-6 cm. longi. *Cymae* terminales, breviter pedunculatae, ad 5 cm. latae, circiter 10-florae, bracteis lineari-subulatis 6-8 mm. longis. *Sepala* basin versus cucullata, 10.5 mm. longa, cornu 1 mm. longo. *Petala* 10.5 mm. longa, spatulato-oblonga, apice truncato-serrata, superne glabra, basin versus angustata, ungue fortiter falcato et stellato-tomentoso. *Stamina* circiter 30; filamenta 10 mm. longa. *Ovarium* sessile, depresso-globosum, pilosum, triloculare; ovula in loculis 2, pendula. *Discus* dense villosus. *Fructus* 4-5 cm. diametro aculeis inclusis; aculei subulato-filiformes, molliter pubescentes.

SOUTH TROPICAL AFRICA. Northern Rhodesia: Miwali, Abercorn, O. B. Miller D.100, 151. "The natives use the pounded roots as a cure for some stomach complaint." Native name "Nakalotye" (W).

Afzelia caudata Hoyle, sp. nov. [Caesalpiniaceae]; affinis *A. bipindensi* Harms, a qua calycis tubo 25-35 mm. longo crassiore, foliolis tenuiter chartaceis vel membranaceis longe et anguste caudato-acuminatis, recedit.

Arbor magna, 30 m. alta et 80 cm. diametro, praeter inflorescentiam glabra, ramulis novellis tenuibus leviter incano-brunneis striatulis sparse lenticellatis. *Folia* paripinnata, 3-4 (-8?)-jugata, petiolo 3-5 cm. longo, cum rhachide tenue minute striato, rhachide 7-13 cm. longo, petiolulis usque ad 5 mm. longis, in genere tenuibus; foliola juvenilia tenuiter chartacea vel membranacea, pellucida, supra nitidula, 7-12 cm. longa, 4-6 cm. lata, ovata vel elliptica vel late oblongo-elliptica, apice plus minusve subito et tenue caudato-acuminata (acumine usque ad 2 cm. longo, acuto, mucronulato), basi late cuneata vel rotundata, nervis lateralibus praecipuis utrinque 9-12 tenuibus arcuatis utrinque subprominentibus, nervis secundi ordinis et venis reticulatis vix minus conspicuis. *Inflorescentia* non visa, sed floribus disjunctis ut videtur sessilibus magnis. *Calyx* coriaceus, extus ferrugineo-tomentellus, tubo crasso 25-35 mm. longo 3-5 mm. lato, lobis 4 inaequalibus intus glabris majoribus obovatis 20 mm. longis 12 mm. latis relictis late elliptico-oblongis 15 mm. longis 9-10 mm. latis. *Petalum* circiter 3.5 cm. longum,

* Continued from K.B. 1932, 270.

2 cm. latum, ungue crassiusculo basin versus et in latere interiore breviter pubescente. *Stamina* 6-7, basin versus breviter et sparse villosa, 3-4 cm. longa; staminodia 2, breviora, tenuiora, dense villosa. *Ovarium* 1 cm. longum, basi et in una sutura sparse pubescens vel fere glabrum, longistipitatum, ultra calycis tubum 5 mm. exsertum, stylo filiforme 3 cm. longo vel ultra glabro. *Legumen* magnum, lignosum, compressum, late ellipticum, 15 cm. longum, 12 cm. latum, 3-4 cm. crassum, a latere in pedicello crassissimo dispositum. *Semina* $\pm$ 7, magna, anguste ovoidea, $\pm$ compressa, 4-5 cm. longa, 2-2.5 cm. lata, 1-1.5 cm. crassa, nigra, nitidissima, basi arillo cupulare aurato irregulariter lobato circiter 1.5 cm. longo munita.

WEST TROPICAL AFRICA. Nigeria: (Ibadan District?) *W. D. MacGregor* 540, type, with flowers, in Kew Herb. and Imperial Forestry Institute Herb., Oxford; Road to Ijebuode from Akilla, *J. D. Kennedy* 2375, seedling, with fruit; Western Provinces, Ondo, *A. H. Unwin* 91, seeds only. Gaboon: Kouilou, *Sargos* (?) 228, seeds only.

The fruit described above is taken from *Kennedy* 2375, comprising a seedling of a "large tree 100 ft. high and 8 ft. girth," together with the fruit of this tree, the leaves being either inaccessible or the tree leafless. The fruit is undoubtedly from an *Afzelia*, and the leaflets match those of the type here described (*MacGregor* 540, with young leaves and flowers), which have a very slender acumen, a feature shared by no other *Afzelia* yet described. The size and extreme beauty of the large jet-black seeds with short golden yellow aril, make the species especially distinct. The pod resembles that of *A. africana* in size and in being attached at right angles to a very stout pedicel, while the flowers approach those of *A. bipindensis*, from which they differ chiefly in the very stout and long calyx-tube, 25-35 mm. long, instead of 15-20 mm.

Macrobium Vignei *Hoyle*, sp. nov. [Caesalpinaceae]; affinis *M. isopetalo* Harms et *M. obanensi* Bak. f., ab illo inflorescentia crassiore et breviora densius tomentosa, calycis tubo longiore et lobis brevioribus, ab hoc inflorescentia multo breviora, bracteolis sero caducis, foliolis caudato-acuminatis, differt.

Arbor mediocris riparia, ramulis novellis purpureo-brunneis ferrugineo-tomentosis demum glabrescentibus cortice cinereo fibrato. *Stipulae* caducissimae. *Folia* pari- vel abortu imparipinnata, 2-3-jugata, petiolo 0.5-1.5 cm. longo basi tumido ruguloso brunneo-tomentoso, rhachide 3-9 cm. longo tenue plus minusve striato brunneo-pubescente glabrescente; foliola opposita vel rarius subopposita, tenuiter coriacea, integerrima, infima ovata, 3-6 cm. longa, 2-3 cm. lata, basi subcordata vel rotundata, reliqua elliptica vel elliptico-oblonga, 7-14 cm. longa, 3-5 cm. lata, basi cuneata vel rotundata, apice gradatim caudato-acuminata, saepe mucronata, supra glabra, obscurissime et tenuiter reticulata, costa impressa, infra reticulata, rufo-brunneo-pubescentia praecipue in costa et

nervis, fere tandem glabra, nervis lateralibus utrinque 5-6 arcuatim fortiter adscendentibus cum costa infra prominentibus; petioluli in sicco nigrescentes, 3-5 mm. longi, brunneo-pubescentes vel tomentosi. *Paniculae* terminales vel rare axillares, interdum subfasciculatae, breviter pedunculatae, circiter 12 cm. longae et 6-8 cm. latae, rhachide brunneo-tomentoso, ramulis 3-4 cm. longis ferrugineo-tomentosis; bracteae caducissimae, bracteolis deciduis obovatis 7 mm. longis 5-6 mm. latis extus ferrugineo-tomentosis intus pubescentibus. *Calyx* glaber, tubo 5-6 mm. longo 3 mm. lato glabro, lobis 3-4 mm. longis late ellipticis inaequalibus. *Petala* 4, posteriore glabro obovato bifido unguiculato 5-7 mm. longo, ungue sparse piloso, reliquis minutis. *Stamina* 3, filamentis 7-9 mm. longis basi pubescentibus. *Ovarium* oblongum, breviter stipitatum, ferrugineo-hirsutum, 6-7 mm. longum, stylo 7-9 mm. longo. *Legumen* late oblongum, lignoso-coriaceum, compressum, 10-11 cm. longum, 5-5.5 cm. latum, rugulosum, densissime atro-brunneo-tomentellum, pedicello crasso 7 mm. longo. *Semina* 2, majus circiter 4 cm. longum et latum, compressum.

WEST TROPICAL AFRICA. Gold Coast: N. Province, Axim District, near Dompim, on river-bank, *C. Vigne* 1968 in Kew Herb. and Imperial Forestry Institute Herb., Oxford, type, with flowers and young fruits; same locality on banks of Bonsa River, *C. Vigne* 1397, with fruits. A medium tree with spreading crown, 40-50 ft. high and 4 ft. girth, brownish-black velvety pods.

Vernacular name (Wassaw) "Totuabo" or "Tutuabo."

Calpocalyx cauliflorus *Hoyle*, sp. nov. [Mimosaceae]; affinis *C. Winkleri* Harms, a qua paniculis valde laxioribus longe pedunculatis haud terminalibus, calycis tubo glabro, bracteolis crassioribus, foliis et petiolis longioribus, foliolis pluribus, recedit.

Arbor alta, ramulis striatis puberulis. *Folia* bipinnata, magna; pinnae unjugatae; petiolus 14 cm. longus, crassiusculus, teres, pulvinatus, striatus, puberulus, glande magna inter bases pinnarum munitus; rhachides pinnarum striati, circiter 45 cm. longi, in sicco brunnei, inter petiolulos omnium jugarum glande muniti; petioluli quadrangulares, in sicco nigri, 3-5 mm. longi; foliola chartacea, 7-8-jugata, opposita, jugis 4-6 cm. distantibus (foliolo singulare pinnae super pulvino circiter 1 cm. disposito), 12 cm. longa, 4.5-6 cm. lata, oblongo-elliptica (foliolo infimo ovato-elliptico), apice caudato-acuminata, acumine 1.2 cm. longo mucronulato, basi obtuse cuneata vel rotundata, margine integerrimo, supra glabra, plus minusve glauca, minute glanduloso-punctata, infra primum in costa et nervis praecipuis minute puberula, tenuiter reticulata, nervis lateralibus praecipuis utrinque 6-8 infra prominentibus valde arcuatis, saepius et tenuiter conjunctis paucis inter hos minus prominentibus nervis e costa abeuntibus. *Paniculae* cauliflorae, elongatae, laxae, usque ad 40 cm. longae vel ultra, primum ferrugineo-tomentellae, pedunculo 8-10 cm. longo, ramulis spicatis circiter 12 cm. longis tenuibus, bracteis principibus caducissimis, floribus subsessilibus confertis,

bracteolis minutis cuneatis caducis. *Calyx* turbinatus, 1.5 mm. longus, ruber, glaber, 5-dentatus, dentibus ciliolulatis. *Corolla* extus ferrugineo-tomentella, intus glabra, tubo 2 mm. longo, lobis oblongis acutis valvatis 2 mm. longis. *Stamina* 10, 5 mm. longa, antheris 1 mm. longis apice glande magna caducissima munitis, filamentis complanatis basi cum disco tenui conjunctis; discus corollae basi adnatus. *Ovarium* breviter stipitatum, obovoideum, 1 mm. longum, ferrugineo-pilosum; stylus filiformis, 3.5 mm. longus, stigmate minuto truncato.

WEST TROPICAL AFRICA. Nigeria: Ikom Division, *D. R. Rosevear* 40/30A (fl.) and 39/30A (leaves), type, in Kew Herb. and Imperial Forestry Institute Herb., Oxford. "A myrmecophilous tree in secondary forest, with cauliflorous flowers, a very striking sight; three or four trees together; leaves and flowers were from the same tree" (*Rosevear*).

***Albizzia flavovirens* Hoyle**, sp. nov. [Mimosaceae]; affinis *A. versicolori* Welw., a qua pinnis foliolisque pluribus, rhachidibus inter omnes jugas pinnarum et inter omnes fere jugas foliolorum glande munitis, pedunculis et pedicellis tenuioribus, recedit.

Arbor parva, ramulis novellis, foliis et inflorescentia $\pm$ dense flavo-viridi-tomentosis vel pubescentibus. *Ramuli* teretes, striati, obscure lenticellati. *Folia* magna, bipinnata, usque ad 30 cm. longa et lata (in statu florescente), petiolo 4-8 cm. longo, rhachide 8-12 cm. longo, cum glande inter unoquamque jugam pinnarum munito, petiolo et rhachide alte striato, pinnis 4-6 jugatis oppositis vel infimis suboppositis, rhachide tenuiusculo alte striato cum glande inter unoquamque jugam foliolorum munito (vel glande infima nulla); foliola 3-8-jugata, opposita, crasse chartacea, 2-6 cm. longa, 1-3.5 cm. lata, subsessilia, rhomboidea vel superiora obovato-falcata, apice obtusa vel rotundata, mucronulata, basi inaequilateralia, rotundata vel oblique truncata, margine integerrimo dense ciliato, supra mox glabra, reticulata, infra primum incano-vel fulvo-tomentosa, tandem pubescentia, reticulata; costa excentrica, in foliolis infimis diagonalis; nervi laterales utrinque 6-9. *Pedunculi* subfasciculati in axillis foliorum juvenilium, tenuiusculi, 6-9 cm. longi, 1-1.5 mm. crassi, alte striati, tomentosi; bractae mox deciduae, lineari-lanceolatae, 3-5 mm. longae, dense fulvo-tomentosae, bracteolis ultimis subaequilongis stipitatis rhomboideis acuminatis. *Flores* in capitulo circiter 20, pedicellis 2-3 mm. longis. *Calyx* 5-6 mm. longus, dentatus, tubo 2-2.5 mm. lato, aureo-tomentellus. *Corollae* tubus 7-8 mm. longus, fere glaber, lobis 3-4 mm. longis oblongis acutis fulvo-tomentellis. *Stamina* 3.5-4 mm. longa, basi in tubo 6 mm. longo connata. *Ovarium* glabrum, 5 mm. longum, stylo filiformi 2.5 cm. longo vel ultra.

WEST TROPICAL AFRICA. Nigeria: Obubra Station, *D. R. Rosevear* 36/31, in Kew Herb. and Imperial Forestry Institute Herb., Oxford, type!

Fagara melanorhachis Hoyle, sp. nov. [Rutaceae]; affinis *F. macrophyllae* Engl., foliis tamen haud armatis, foliolis latioribus breviter acuminatis, petiolulis longiusculis, floribus minoribus, differt.

Arbor fere glabra, ramulis novellis atrobrunneis vel nigris minutissime puberulis crassis lenticellato-striatis sparse et breviter armatis, cortice tandem cinereo. *Folia* pinnata, 50–100 cm. longa, rhachidibus et petiolulis in sicco atrobrunneis vel nigris striatis minutissime puberulis, petiolo 10–18 cm. rhachide 25–70 cm. longo, petiolulis 7–10 mm. longis; foliola utrinque 16–26, tenuiter coriacea, minute pellucido-punctulata, subopposita vel alternantia, 12–20 cm. longa, 5–8 cm. lata, oblique oblongo-elliptica, apice acuminata, basi valde inaequalia, latere superiore rotundato latere inferiore angustato, supra nitidula, utrinsecus laxe reticulata, obscuriuscule glanduloso-punctulata, margine integerrimo vel obscurissime crenulato; nervi laterales utrinque 12–16, subprominentes, prope marginem duplo allicti, inter eos nervis obscurioribus e costa abeuntes; costa supra vix impressa, infra prominens, minutissime puberula vel glabra. *Paniculae* amplae, patentes, usque ad 50 cm. longae, rhachide nigrescente angulato vix armato, ramis puberulis, floribus unisexualibus (masculis visi solis) sessilibus et subglomerulatis in ramulis puberulis subspicatis; bracteae bracteolaeque minutae, puberulae, caducissimae. *Calyx* puberulus, intra 1 mm. longus, obtuse 5-dentatus, dentibus apertis ciliolatis. *Petala* 5, oblongo-elliptica, obtusa, leviter imbricata, 2 mm. longa, glabra, glandulosa. *Stamina* 5, filamentis 2–2.5 mm. longis complanatis. *Discus* magnus, carnosulus, late ovoideo-conicus, glaber, 1.5 mm. diametro, $\pm$ 5-lobatus. *Ovarium* abortivum conicum, in apice disci dispositum.

WEST TROPICAL AFRICA. Nigeria: Sapoba, *J. D. Kennedy* 2297 in Kew Herb. and Imperial Forestry Institute Herb., Oxford, type. Same locality, *Kennedy* 337. "No prickles on leaves." Flowers April to June.

Vernacular name (Benin) "Okor."

XXII—A STUDY OF VARIATION IN GLAUCIUM FLAVUM. W. B. TURRILL.

TAXONOMIC HISTORY.

The common yellow horn (or horned) poppy is a striking plant when in flower and has attracted attention throughout historic times. Thus, Theophrastus, *Enquiry into Plants*, IX. xii. par. 3, transl. Hort, ii. 279 (1916), says "There are several kinds of wild poppy: the one called the horned poppy is black: the leaf of this is like that of the black mullein, but it is not so black; the stem grows about a cubit high, the root is stout and shallow, the fruit is twisted like a little horn: it is gathered at the time of wheat harvest. It has the property of purging the belly, and the leaf is used for removing ulcers on sheeps' eyes. It grows by the sea, wherever there is rocky

ground." It may be noted that Sir Arthur Hort, l.c. 490, identifies this plant, μήκων ή κεραιτίς as *Glaucium flavum* var. *Serpieri*.

The plant was also well-known to the pre-Linnean botanists and herbalists, but it is not essential for our present purpose to quote these in detail. The modern botanical history of the species begins with Linnaeus who gave it the name of *Chelidonium Glaucium* (Sp. Pl. 506: 1753). His brief description reads: "Chelidonium pedunculis unifloris, foliis amplexicaulibus sinuatis, caule glabro," and, with the synonyms he cites, is sufficient to fix the species in a general sense. For "habitat" he gives "in Angliae, Helvetiae, Galliae, Italiae, Virginiae arenosis." In the second edition of the Species Plantarum (724: 1762) Linnaeus adds the following description "Planta glauca. Caulis laevis. Folia scabriuscula: radicalibus pinnatifidis; caulinis solum lobatis. Flores flavi. Siliquae scabrae, dissepimento in loculamenta, uti sequentes, distinctae." *Glaucium* (sub nom. *Chelidonio*) *corniculatum* is described (ed. 1) as "Chelidonium pedunculis unifloris, foliis sessilibus pinnatifidis, caule hispido," and in ed. 2 a var. "β. Papaver corniculatum phoeniceum glabrum. Bauh. pin. 171" is added and an additional description given: "Planta viridis. Folia omnia pinnatifida. Flores rubro lutei. Siliquae hispidae," with the habitat "in Hungaria, Bohemia, Monspelii." By the use of the symbol ☉ Linnaeus regards both species as annual. In the Linnean Herbarium there is one sheet written up *Chelidonium Glaucium*. The specimen is in young flower only, without even immature fruits. The following are characters of the specimen: lower leaves decidedly hairy, upper nearly glabrous with few scattered hairs, rather large and not deeply lobed; flower-stalks glabrous; sepals with scattered bristly hairs; petals about 3 cm. long. One sheet is also written up *Chelidonium corniculatum*. The characters of the flower and young fruit are those of *Glaucium corniculatum* as generally accepted—small red flowers, ovary and young fruit strongly clothed with adpressed hairs.

An account of the origin of the name "*Glaucium*" and its mythological connection with the yellow horn poppy is given in Sowerby's English Botany, ed. 3, Syme, i. 98 (1863).

Botanically, the name γλαύχιον was applied by Dioscorides to herbs which, when wounded, yielded a yellow juice (Pfeiffer, Nomencl. Bot. i. pt. 2, 1450: 1874). In approximately its present usage it was employed by Tournefort, Instit. ed. 3, i. 254 (1719). The plate (t. 130) shows, in addition to an open flower, petal, and flower-bud, a glabrous ovary and glabrous fruits. In the English edition, 1719 (with numerous additions from other works), a much enlarged account of the genus is given (i. 554) and a re-engraving of the plate, with very slight modifications, is printed as t. 131. It is evident that Tournefort included in his genus what we now call *Glaucium flavum* (*G. luteum*) and *G. corniculatum* and excluded *Chelidonium majus*, (l.c. 231, t. 116). Adanson (Fam. des Plantes, ii. 432: 1763)

accepted Tournefort's two genera and it is somewhat strange they should have been united by Linnaeus. Bentham and Hooker (Gen. Plant. i. 53 : 1862) quote Juss. Gen. 236 (1789) as the authority for the generic name in the sense in which they use it. Jussieu, l.c., certainly gives a clear definition of the genus *Glaucium* sufficing to distinguish it from *Chelidonium* sensu stricto. Yet, Crantz, Stirp. Austr., fasc. ii. 133 (1763), defined *Chelidonium* and *Glaucium* as separate genera, admonishing Linnaeus for errors in both generic and specific descriptions. Under the genus *Glaucium* Crantz describes two species, *G. flavum* and *G. phoeniceum*. Although the Linnean names are not cited there is no doubt from the synonymy that the names are intended to replace *Chelidonium Glaucium* and *C. corniculatum* respectively. By the latest rules of botanical nomenclature the combination *Glaucium Glaucium* is not allowed and Crantz's name *G. flavum*, antedating *G. luteum* Scop., Flor. Carn. ed. 2, i. 369 (1772), is valid. On the other hand *G. phoeniceum* Crantz does not retain the Linnean trivial *corniculatum* and must be replaced by *G. corniculatum* (L.) Curt. Flor. Lond. fasc. vi. t. 32 (1798).

RELATIONSHIPS AND VARIATIONS.

Fedde, in his account of the genus *Glaucium* in Das Pflanzenr. Heft 40 (iv. 104), 221-238 (1909), does not classify the 21 species he accepts into subgenera or other taxonomic divisions. In his Clavis the first separation is into A, those species with the ovary more or less pilose or somewhat prickly and B, those species with the ovary provided with tubercled, prickly, or scale-like papillae or glabrous, not pilose. In the former group are placed, with other species, *G. corniculatum* Curt. and *G. grandiflorum* Boiss. et Huet ; in the latter *G. flavum* Crantz and *G. leiocarpum* Boiss.

The difficulty of making a satisfactory classification of available material into species is well illustrated by comparing Fedde's account (which is based largely on that of Boissier in Flor. Or. i. 119 et seq. : 1867) with that of Otto Kuntze in Act. Hort. Petrop. x, 147 et seq. (1887). Kuntze gives an interesting account of the characters supposed by different authors to be valid for separating species, and shows conclusively that these characters occur in many combinations only some of which have been accepted as diagnostic for species. As a result of his investigations he sinks all the species of the genus known to him as "Varietäten etc." under the one name *Glaucium corniculatum* Crantz em. While acknowledging that, from the purely morphological standpoint, there is something to be said for Kuntze's conclusions these cannot be accepted as a whole because he has not considered the relationship of geographical and ecological criteria to the gross morphological criteria alone used by him. That petal-colours, types of capsule indumentum, types of indumentum of vegetative parts, size of flowers, and shapes of leaves do show a degree of independent variation is true, though the linkage of characters is rather greater than Kuntze admits. When, however, we

find, as we do, that certain character combinations are constant, except for a few exceptions usually explicable by alien introduction, for geographical regions or definite (ecological) habitats, we have to review Kuntze's conclusions with the aid of facts he ignored. Unfortunately, neither experimental (genetical, cultural) nor cytological data are yet available to aid in a taxonomic study, and proposed division into and arrangement of species must, therefore, be of a highly tentative nature, as is most taxonomic theory.

Glaucium corniculatum Curt., with its distinct rather setose indumentum of usually adpressed hairs on the ovaries and capsules, and its occurrence as a weed of arable land, a constituent of the open vegetation of dry stony slopes, or of loose soil not associated with coastal conditions, is considered a separate species from *G. flavum*. It is true that *G. corniculatum* shows a large range of petal colour and also that some of the species grouped round it are very doubtfully distinct from it. We are, however, concerned here with *G. flavum* and a survey of the material preserved at Kew will indicate the polymorphy of this species. With some exceptions in the Nearer East (see below), *G. flavum* is limited, as a native plant, to sand-dunes, shingle-beaches, and other habitats near the coast or to river-beds (rarely).

British Isles : *G. flavum* occurs on the coasts of all or nearly all our maritime counties. Druce (Comital Flora of the British Isles, 14: 1932) gives the vice-county records as 52 [6]. H.16. S., and says "thins out or disappears on the northern Scottish shores. Extinct in the single Zetland station. All round Ireland." At Kew there are 40 localized collectings of the plant from the British Isles and the following notes are based on these and on field studies. The species is most often biennial or perennial. In luxuriance of development it is rather readily modified by environmental factors. There is a considerable range in the degree of development of the indumentum in the cauline vegetative parts from glabrous (St. Ouen's Bay, Jersey, *Turrill* 3039), few to very few scattered hairs (Hunstanton, Norfolk, *Miss Bell*), to a thick pubescence, especially on the leaves (Par Sands, Cornwall, *Pascal*). The degree of leaf cutting of the cauline leaves varies considerably but the range is less than in the Mediterranean Region. There is a tendency for the less highly divided and frequently larger leaves to be the more glabrous. The flower stalk is usually glabrous, rarely (e.g. Gosport, Hants, *Adams*, and Yarmouth, *Pagel*) with scattered distinct rather long hairs. The sepals in all the specimens examined have scattered rather long distinct hairs fluctuating in number. The petals range from 2.5 cm. to 3.5 cm. in length and from 2 cm. to 3.8 cm. in breadth. The ovaries and young fruits are nearly always rough with closely set, very small tubercles. As the fruit matures it becomes relatively smoother by the spacing out and more or less complete obliteration of the tubercles. Much more rarely the tubercles are replaced by more distinct asperities (Instow, Devon, *Watson*, and Swansea,

Moggridge). The fruit develops to a great length, up to 28 cm. (and probably more), and is usually rather flattened, 4–5 mm. broad when mature. The developing fruit is occasionally constricted at intervals (*Yarmouth, Paget*) or contorted, *St. Abbe's Head, Berwick, Balfour*).

Scandinavia: The material available from Scandinavia is meagre. The specimens seen come within the range of variation shown by British examples and have glabrous flower stalks and mature fruits. *Blytt* (*Norges Flora*, iii. 951 : 1876) gives a number of localities, but recognizes no varieties. *Lindman* (*Svensk Fanerogamflora*, 267 : 1918) records it from Sweden, but without quoting specimens, and also recognises no varieties.

Central Europe: In Central Europe *G. flavum* is nowhere originally wild but occurs in many places as a multiplied garden escape or as an alien of ballast and rubbish heaps. A list of localities is given by *Hegi* (*Illustr. Flor. v. Mitt.-Eur.* iv. pt. 1, 23 : 1913). The range of variation in the material available is not great. The papillose asperities or small tubercles on the immature fruits are frequently well developed. The fruits usually agree with those of specimens from the Atlantic coasts, but on one from *Vaud (Favrat and Barbey)* are more slender but long.

Iberian Peninsula and France: *Willkomm* and *Lange* (*Prodr. Flor. Hispan.* iii. 874 : 1880) describe two varieties in the following terms :

α. *vestitum*, foliis magis minusve pilosis, capsula scabriuscula.

β. *glabratum*, foliis glabris, capsula laevi.

The species is said to occur "in arenosis maritimis totius Hispaniae, raro in interiore," and a considerable list of localities is given. *Coutinho* for Portugal (*Flor. de Port.* 243 : 1913) and *Rouy* and *Foucaud* (*Flor. de France* 164 : 1893) retain the same two varieties. Again, the species is most often found near the coast or can be traced from the coast up the river-valleys, though, in the south it occasionally occurs on hill slopes or in fields. The descriptions attached to the varieties suggest a definite correlation between the presence or absence of indumentum of the vegetative parts and the presence or absence of scabridity of the capsules. There is no example at Kew showing glabrous basal leaves. The degree of indumentum shown by the cauline leaves ranges from very dense (in arenosis maritimis, near Oporto) to none (*Plombiers, Bonnet*). The uppermost leaves are usually much more nearly glabrous than those below. The capsules when ripe are glabrous or have a few scattered asperities, but the number of papillose asperities on the immature fruits varies from numerous (*Rampart Tivoli à Dijon, Bonnet*) to few (*Ribiers, Reverchon*) and independently of the hairiness of the foliage. One specimen from near Oporto, "in arenosis maritimis," deserves special mention. The leaves are densely hairy and the (single) very young fruit is closely covered with papillae elongated almost to the length of hairs. The flower-stalks are

generally glabrous or (near Monfalcone, 1862) have a few coarse hairs. The flower size is small to medium and the capsules are on the whole shorter and more slender than in British material. A specimen such as that collected by *David* near Tallard (Herb. Borel) is scarcely distinguishable from *G. leiocarpum* Boiss. (see below).

Corsica, Sardinia, Italy, and Sicily: Briquet (Prodr. Flor. Corse, ii. 3 : 1913) states that in Corsica the species inhabits "sables littoraux, d'où il remonte cà et là le long des cours d'eau jusque dans l'intérieur, par. ex. à Ponte alla Leccia." He believes that variations in indumentum, of the foliage "nous paraissent être en rapport avec le milieu et n'avoir qu'une valeur individuelle." Moris (Flor. Sardoia, i. 80 : 1837) records it "in arenosis maritimis Sardiniae et insularum la Maddalena, Tavolara, frequens." He distinguishes no varieties. Fiori e Paoletti (Flor. Anal. d'Ital. i. 484 : 1898) say the plant occurs "nelle arene mar. della Pen., Istria ed isole; raram. importato entro terra." Pojero (Flor. Sicula i. 56 : 1888) says "spiagge arenose lapidose ovunque in Sicilia e nelle Isole, raramente nell' interno." The range of variation appears to be similar to that in the French material, except for the occurrence of larger petals and glabrous (to very nearly glabrous) sepals on one specimen (Apulia loc. glareosis ad littora maris adriat. circa Rodi, *Porta et Rigo*), and that ripe fruits usually approximate in length and diameter to British material, though Corsican material has more slender capsules.

Balkan Peninsula and Eastern Mediterranean Region. In the large area considered under the above title *Glaucium flavum* shows its maximum variation. Names have been given to plants showing combinations of characters which it is here concluded come within the one species. These must be considered in some detail.

Boissier (Flor. Or. i. 122 : 1867) described *G. leiocarpum*, quoting ten collections from Asia Minor, Syria, and North Persia. Fedde retains the species and extends its accepted area of distribution both westwards (to Crete and Naxos) and eastwards ("Tukmenien"), Hayek (Prodr. Flor. Penins. Balc. i. 353 : 1925) also retains the species, and gives its distribution for the Balkan Peninsula as Dobruja, Thrace, Cyclades, and Crete, from all of which areas he also records *G. flavum*. Several of the collections cited by Boissier are at Kew in addition to much material of *G. flavum* sensu lato not cited by him. It is evident that what authors have accepted as *G. leiocarpum* extends from the Balkan Peninsula eastwards, and what they have accepted as *G. luteum* extends mainly, though not entirely, westwards. The diagnostic characters used by the above authors to distinguish *G. leiocarpum* from *G. flavum* are :—

- (1) more slender often twisted stems ;
- (2) upper leaves smaller ;
- (3) sepals glabrous ;
- (4) petals "lateritio-fulva" ;
- (5) fruits shorter, more slender, smooth, and often subattenuated between the seeds.

The characters under (1) and (2) show such fluctuation in both eastern and western material that only a statistical study on much more extensive material than is available could show their worth. There is apparently a tendency for plants of the *flavum* group to be less robust as one traces them eastwards. The sepals are not glabrous in authenticated material of *G. leiocarpum* (e.g. Antilebanon, Gaillardet 390). The question of flower-colour is dealt with separately below. This leaves the fruit characters for consideration. Without doubt the fruits are usually shorter, more slender, and more narrowly cylindrical, and in the stages of their development show a greater tendency to glabrescence in plants from Asia Minor, named sometimes *G. luteum* (*flavum*) sometimes *G. leiocarpum*, than in plants from the Atlantic coastlands named *G. luteum*. The constriction of the fruit between the seeds (siliqua inter semina saepius subattenuata) is fairly well seen in Gaillardet's specimen already quoted but in few others and is almost certainly a fluctuating character. It is, e.g., not seen in *Kotschy* 13 from the Taurus. The critical point is whether the fruit shape, size, and glabrescence, are so constant, show so high a correlation, and distinct geographical or ecological distribution that they can reasonably be given specific value. Gaillardet's specimen is taken as a standard of *G. leiocarpum*.

No specimens from the British Isles, Scandinavia, the Iberian Peninsula, or Central Europe have been seen which have been or could be definitely considered *G. leiocarpum*. Much French material, however, has shorter, more cylindrical, and more glabrescent capsules (e.g. near Tallard, *David*, Herb. Borel). Corsican material has slender, Sardinian and Sicilian broader capsules. Cretan material shows rather broad (*Reverchen*, La Canée) or nearly cylindric and short capsules (*Heldreich*, Grabusa). The last specimen approximates to *G. leiocarpum* but the fruits have a rather greater diameter (4 mm.) and the young ovaries are strongly papillose above.

The only Greek material seen is from Laurion. This is all named *G. Serpieri* Heldr. (*Gartenflora*, xxii. 325 : 1873). Heldreich's account is not accompanied by a full Latin description but one is provided in Boiss. Flor. Or. Suppl. 24 (1888). Heldreich emphasizes the Crocus-yellow colour of the flowers with a dark violet blotch at the base of each petal, the large flowers, and glaucous, deeply bipinnatifid leaves with small end lobes. There is one sheet at Kew collected at Laurion by Heldreich in 1873 which agrees well with his account except that the flowers are no larger than those of many western European specimens. The mature fruits are glabrous, cylindrical, and short like those of accepted *G. leiocarpum* material. We have, however, to note specimens collected on Laurion by Haussknecht (1885) and by Heldreich (No. 1107 : 1890, two sheets). These have foliage indistinguishable from that of western material, but have shorter fruits which are either cylindrical or (No. 1107, one sheet) show some tendency to broaden. The flower-stalks are glabrous and the sepals have setose hairs. Ignoring flower colour

for the moment, it appears that *G. Serpieri* comes within the variation range of *G. leiocarpum* as understood by Boissier and has no close connection with *G. grandiflorum*.

Material from the Cyclades, South (Greek) Macedonia, Thrace, and Bulgaria again shows the shorter, more cylindrical, glabrous capsules assumed to be characteristic of *G. leiocarpum*. In Dalmatia, Croatia, and Istria, a greater mixture of types is apparent. From Ragusa (*Adamović*) is a specimen with glabrous pedicels and fruits, the latter approximately cylindric and showing attenuation between the seeds. Other specimens (Lesina, *Alexander Prior*; near Zeleniko, *K. Maly*) have setose-hispid pedicels and more or less asperous (immature) fruits. The degree of indumentum development on the vegetative parts and the flower size, also show a wide range. On the basis of comparison with plants from the Adriatic coastlands alone it would appear that "*G. leiocarpum*" is to be included in *G. flavum*.

In Europe *G. flavum*, even in the wide sense, is most often limited to the sea-coast or to habitats with loose soil and open vegetation not far from the coast. Occasionally it occurs on the stony, sandy débris of river valleys liable to flood (as in South France) or, as a casual, in more inland stations. In Asia Minor, and probably also farther east in Persia, it occurs naturally inland as well as near the coast, and, like specimens from Syria, Palestine, and Cyprus, most often shows at least some of the characters of *G. leiocarpum* Boiss. Leaf-shape, indumentum, and flower-size, range as widely as in ordinary European material. The sepals may be strongly setose (*Lycaonia*, *Heldreich*) or nearly glabrous (near Angora, *Lindsay* 56). The pedicels are generally glabrous, more rarely with a few bristly hairs, and the fruits usually approximate to the *leiocarpum* type, though material like that of Bové 456 (near Gaza and Jaffa) is difficult to sort on fruit characters. Flower size shows a wide range.

Heldreich (l.c., 1873) describes and figures (t. 776) a "double-flowered" variation of his *G. Serpieri*. Haussknecht, in Mitth. Thur. bot. Ver. iii.-iv. 101 (1893), gives this as var. *plenum* of *G. flavum*. The occurrence of flowers, in *Glaucium*, with petals multiplied to the extent shown in Heldreich's figure must result from a rare mutation.

The question of variation in flower colour requires further investigation than is possible from dried herbarium material. The petals of most western European plants are yellow. Fedde says "aurea, lucide flava vel sordide lutea." The var *fulvum* (as species Smith, Exot. bot. i. 11, t. 7: 1804) has petals described as "lateritio-coccinea, basi flava." *G. Serpieri* (*G. flavum* var. *Serpieri* Hausskn.) is said to have the petals "crocea basi violaceo-vel purpureo-maculata," and *G. tricolor* Godr. "petalis rubro-aurantiacis basi maculatis." Boissier, in his original description gives *G. leiocarpum* "petalis lateritio-fulvis." One can say, in general, that the range of colour variations, and especially the occurrence of

deeper colours, increases as one goes from east to west, to reach a maximum in Asia Minor.

No structural differences have been detected between ripe seeds of members of the *G. flavum* group.

For quick comparison of one plant with another, for tracing the geographical distribution of characters, and for the scoring of populations in the field, in such a species as *Glaucium flavum* as here understood, a designation of varieties by symbolic formulae is better than attaching a name with a more or less perfect description to some only of the variation-combinations and ignoring others. It is true that a really satisfactory scheme can only be prepared after a species has been extensively and intensively studied by experimental and field methods (see Marsden-Jones & Turrill in Kew Bull. 1929, 168 & 1931, 136), but the possibility of using such a scheme on ordinary herbarium material is worth a trial. The following symbols are suggested for *G. flavum* :

- S.1. stem hairy (bristly).
 - 2. stem glabrous.
- L.1. cauline leaves hairy (bristly).
 - 2. cauline leaves glabrous.
 - 3. cauline leaves entire or very slightly lobed.
 - 4. cauline leaves more or less deeply lobed.
- P.1. flower stalk hairy (bristly).
 - 2. flower stalk glabrous.
- K.1. sepals hairy (bristly).
 - 2. sepals glabrous.
- C.1. petals 3 cm. or less in length.
 - 2. petals more than 3 cm. long.
 - *3. petals pale yellow (apart from any basal blotch).
 - *4. petals of another colour than pale yellow.
 - 5. petals with basal blotch.
 - 6. petals without basal blotch.
- G.1. ovaries and young fruits rough.
 - 2. ovaries and young fruits smooth.
- F.1. mature fruits 20 cm. or less in length.
 - 2. mature fruits more than 20 cm. in length.
 - 3. mature fruits 4 mm. or less in breadth.
 - 4. mature fruits more than 4 mm. in breadth.
 - 5. fruits contorted.
 - 6. fruits not contorted.
 - 7. fruits constricted between the seeds.
 - 8. fruits not constricted between the seeds.

Examples of the application of this scheme are :
Hurst Castle, Hants, *Turrill* 3040.

S.2. L.1.4. P.2. K.2. C.1.3.6. G.1. F.2.4.6.8.

*Fuller investigations, with living material, are necessary before colour characters can be satisfactorily classified and symbolized.

St. Ouen's Bay, Jersey, *Turrill* 3039.

S.2. L.2.4. P.2. K.2. C.I.3.6. G.I. F.—

Bohuslan, Sweden, *Lagerstedt*.

S.2. L.I-2.4. P.I. K.2. C.I.3.6. G.I. F.2.4.6.8.

St. Piler, France, *David*.

S.2. L.I.4. P.2. K.2. C.I.— G.I. F.I.3.6.8.

St. Canée, Crete, *Reverchon*.

S.2. L.I.4. P.2. K.I. C.I.3.6. G.I. F.2.4.6.8.

Laurion, *Heldreich* (as *G. Serpieri*).

S.2. L.I.4. P.2. K.I. C.2 (?) 4.5. G.I. F.I.3.6.7.8.

Athos, *Chick* 67.

S.I. L.I.4. P.2. K.2. C.2.4.6.(?). G.I. F.—

Ragusa, *Adamović*.

S.2. L.I.4. P.2. K.I-2. C.— G.2. F.I.3.6.7.

Near Zelenika, *Maly*.

S.I. L.I.4. P.I. K.I. C.2— G.I. F.I.3.6.8.

Near Trieste, *coll.* ?

S.I. L.I.4. P.I. K.I. C.I.— G.I. F.I.4.6.8.

Schvitzizza, *Staub*.

S.2. L.2.4. P.2. K.— C.— G.I. F.I.3.6.7-8.

Egin, Armenia, *Sintenis* 2622.

S.2. L.2.4. P.2. K.2. C.2.4.5. G.2. F.I.3.6.7(?).

Barrada Gorge, Antilebanon, *Gaillardet* 390.

S.2. L.2.3. P.2. K.I. C.— G.2. F.I.3.6.7.

Larnaka, Cyprus, *Sintenis et Rigo* 897.

S.2. L.I.4. P.2. K.I. C.I.4.6.(?). G.I. F.I.3.6.8.

CONCLUSIONS: The intensive study of gross morphological characters in *Glaucium flavum* so far as is possible from herbarium material alone, has led to a number of interesting conclusions.

1. There appear to be no sufficient reasons for retaining *G. leiocarpum*, *G. Serpieri*, *G. fulvum*, and *G. tricolor* as species distinct from *G. flavum*. They represent certain combinations of characters which occur also in other combinations and which show no clearly marked geographical or ecological isolation.

2. The occurrence of *G. Serpieri*, on ground from which old mining débris had been cleared, cannot be considered as proof that the seeds had remained dormant 1500–2000 years in the soil, covered by the accumulation of scoriae resulting from slave labour in classic times, since it comes within the variation range of a species common in countries bordering the Aegean. *Heldreich* (l.c. and *Atti Congr. Intern. Bot. Firenze*, 136: 1874) gives no evidence which can be accepted as proof of such dormancy. The matter is discussed with reference to *Silene subconica* (*S. juvenalis*) in *Kew Bull.* 1933, 40.

3. *G. leiocarpum* (with which *G. Serpieri* must be closely associated) is a name which has been applied to plants of the Eastern Mediterranean Region with slender, relatively short, glabrous fruits and darker flowers. In other characters the material from Asia Minor and elsewhere shows as great a range of variation as is found in

western European *G. flavum*. Moreover, the fruit characters are not entirely clear-cut and oriental plants approximating to *G. flavum* in fruit characters and western plants approximating to *G. leiocarpum* have been examined. It seems most reasonable to place *G. leiocarpum* as a variation of *G. flavum* insufficiently isolated to deserve specific rank.

4. Accepting *G. flavum* in the suggested wide sense it becomes clear that the species is most polymorphic in the Eastern Mediterranean Region, and especially in the Balkan Peninsula, that it spread westwards and in doing so *G. flavum* sensu stricto (*Chelidonium Glaucium* L.) segregated out. Such a segregation involved the relative purification of the population so far as fruit characters were concerned, or, in other words, the population came to consist of a smaller and slightly different set of biotypes characterized by longer and broader fruits, yellow flowers, and adaptation to coastal conditions.

Eastwards from the Balkan Peninsula a selection, apparently less complete, has tended to the predominance of shorter, more slender, glabrous fruits and darker flowers. Plants showing these last characters can be designated *G. flavum* Crantz var. *leiocarpum* (Kuntze, pro parte) Stoy. et Stef. Flor. Bulg. i. 471 (1924).

5. A scheme for comparing plants showing different character combinations within a polymorphic species has been applied with considerable success to herbarium material. It is hoped that the method will be tested by other systematists over a wide range of species and genera.

6. *G. corniculatum* Curt., *G. arabicum* Fresen., *G. grandiflorum* Boiss. et Huet, *G. Haussknechtii* Bornm. et Fedde, *G. aleppicum* Boiss. et Husskn., *G. fimbriigerum* Boiss., *G. squamigerum* Kar. et Kir., *G. pulchrum* Stapf, *G. elegans* Fisch. et Mey., *G. contortuplicatum* Boiss. and *G. cappadocicum* Boiss. are considered to be specifically distinct from *G. flavum* without prejudice to their relationship one to another. *G. calycinum* Boiss., *G. oxylobum* Boiss. et Buhse, and *G. acutidentatum* Hauskn. et Bornm. may be only variations within *G. flavum*, but the material available is at present not complete enough to justify their definite reduction. No specimens or insufficient material has been seen of *G. caricum* Stapf, *G. quadratifolium* Fedde, *G. vitellinum* Boiss. et Buhse, *G. paucilobum* Freyn, *G. insigne* Popow, and *G. refractum* Nábelek.

XXIII—DECADES KEWENSES. PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM. DECAS CXXIX.

1281. *Medinilla gratiola* Stapf [Melastomaceae]; *M. Curtisii* Hook. f. proxima, sed foliis petiolatis basi haud cordatis, floribus maioribus circiter 25 mm. diametro, petalis leviter roseo-suffusis, antheris albidis vel subflavidis distincta.

Frutex epiphyticus, humilis, glaberrimus, ramis pendulis cylindraceis modice lenticellatis. *Folia* opposita, petiolo crassiusculo 5–8 mm. longo suffulta; lamina late oblongo-lanceolata vel oblanceolata, basi subobtusata, apice breviter acuminata, circiter 10 cm. longa, 4 cm. lata, carnosula, facie obscure viridis, dorso pallida, triplinervis, nervorum iugo 8–10 mm. supra basin orto. *Cymae* 3–2-florae in paniculam pendulam laxiusculam pedunculo 3 cm. longo insidentem collectae; bracteae minutissime vel obscurae; pedicelli ad 4 mm. longi. *Receptaculum* obconicum, albidum, 8 mm. longum, apice 6 mm. diametro. *Calyx* annularis, truncatus, apiculis 5 minutis virescentibus notatus. *Petala* 5, late obovata, superne subundulata, 12 mm. longa, 9 mm. lata, alba leviter roseo suffusa. *Stamina* 10, aequalia; filamenta flavescentia, 6 mm. longa; antherae albae vel subflavae, incurvae, 6–7 mm. longae, connectivo antice bilobo, lobis aureis. *Ovarium* ope septorum 10 fere a basi receptaculo adhaerens, apice roseo.

MALAY PENINSULA. Fraser Hill, on the Phaang-Selangor frontier (3° 42' N., 101° 44' E.), at about 1300–1400 m.; introduced to the Royal Botanic Gardens, Kew, from the Botanic Gardens at Singapore in 1929.

1282. **Erica (Evanthe) Fourcadei** L. Bolus [Ericaceae]; ab *E. glandulosa* Thunb., foliis vix pilis glanduliferis onustis, adultis saepe ovalibus coriaceis supra glabris nitentibusque, pedunculis longioribus saepe ad 1 cm. longis, sepalis saepius brevioribus 5–6 mm. longis, differt.

Rami visi rigidi, ad 25 cm. longi, ad 5 mm. diam. *Folia* adulta adscendentia vel demum patentia, parce ciliata, ad 1 cm. longa, ad 5 mm., vel marginibus valde revolutis 2 mm. lata. *Pedunculi* rarius ad 1.2 cm. longi. *Bracteae* 2 approximatae, tertia medio, vel supra medium, posita. *Corolla* saepissime omnino glabra, bucciniformis, 2.5–3.2 cm. longa cum segmentis rotundato-deltaideis ad 2 mm. longis. *Antherae* infra medium insertae, aristis minutis de filamentis decurrentibus.

SOUTH AFRICA. Knysna Div.; Plettenberg Bay, 500 ft., Sept. 1926, J. Phillips (Forest Research Station, no. 1115); Humansdorp Div.; near Witte Els Bosch, among rocks of the seashore, H. G. Fourcade 2975 (type).

1283. **Erica (Pseuderemia) Holtii** Schweickhardt, sp. nov. [Ericaceae]; *E. Solandrae* Andr. affinis, sed pilis glanduloso-capitatis differt.

Suffrutex diffusus. *Rami* fere 20 cm. longi, tenues et debiles, rubro-fulvi et glanduloso-pilosi. *Folia* 2–4-nata, 2–4 mm. longa, linearia, sulcata, apice in pilum glanduloso-capitatum producta, glanduloso-pilosa. *Capitula* subglobosa, diversiflora. *Pedicelli* fere 2.5 mm. longi. *Bracteae* sepalis fere aequales aut breviores. *Sepala* 3 mm. longa, linearia, apice subacuta, glanduloso-pilosa. *Corolla* 4 mm. longa, alba, extra et intra glabra; tubus ovato-urceolatus vel

urceolatus, fauce constricta ; lobi rotundati, leviter patuli, circiter 1 mm. longi. *Stamina* inclusa ; antherae aristatae ; aristae subulatae, minute puberulae, thecis aequalibus. *Ovarium* villosum ; stylus inclusus vel exertus ; stigma capitellatum.

SOUTH AFRICA. Transvaal: Lydenburg distr. ; Kemps Heights, March, *Holt* 226 (and in *National Herb.* 12461).

1284. ***Erica (Arsace) Keetii* L. Bolus** [Ericaceae] ; ab *E. copiosa* foliis glabris, corolla urceolari majore, stylo incluso, differt.

Erecta, ad 60 cm. alta. *Rami* graciles, floriferi 28 cm. longi ; ramuli copiosissimi, saepe 1-2.5 cm., ultimi 5 mm., longi. *Folia* 3-nata, fere erecta, imbricata, anguste sulcata, suboblunga, subobtusata, parce ciliata, ad 2 mm. longa cum petiolo 0.5 mm. *Flores* 3-nati. *Pedunculi* pubescentes, 2 mm. longi. *Bracteae* superiores 1 mm. longae, supra medium, tertia prope medium, positae, 1.25 mm. longae. *Sepala* pallide rosea, inferne scariosa, ciliataque, superne lateraliter compressa sulcataque, 1.75 mm. longa, ad 1 mm. lata. *Corolla* globoso-urceolata, sepalis impressa, 3 mm. longa cum lobis obtuse deltoideis 1 mm. longis. *Filamenta* complanata ; antherae ultra tubum partim exsertae, suboblongae, obtusae, poro dimidium lobi aequante, aristis longe ciliatis lobo aequilongis. *Discus* conspicuus. *Ovarium* breviter obconicum, superne pilosum, pilis erectis ; stylus superne ampliatus, staminibus parum brevior ; stigma capitatum.

SOUTH AFRICA. Knysna Div. ; Kaffir Kop, 1000 ft., Sept. 1921, *J. D. Keet* (Botanical Survey of S. Africa) 777. "Stiff sour veld soil, along road only, associated with *E. formosa*, not common."

1285. ***Erica (Didymanthera) leucosiphon* L. Bolus** [Ericaceae] ; ab *E. primulina* Bolus, foliis glabris, pedunculis longioribus, bracteis remotioribus, sepalis latioribus, differt.

Erecta, rigida, ut videtur ad 20 cm. alta. *Rami* atrati, ad 5 mm. diam. ; ramuli floriferi tomentosi, saepius ad 2 cm., rarius 3.5 cm., longi. *Folia* fere erecta, dense imbricata, 3-nata, linearia, acuta, angustissime sulcata, inferne ciliata, 4-6 mm. longa cum petiolo 1.5 mm. *Flores* 3-nati vel rarius 1-2-nati, saepe cernui, glabri. *Pedunculi* tomentosi, 0.6-1.3 cm. longi. *Bracteae* albae, subchartaceae, late ovatae, inferior 3-4 mm. longa, medio, superiores parum supra, positae, ad 5 mm. longae. *Sepala* erecta, concava, ovato-orbicularia, alba, ad 6.5 mm. longa, ad 5 mm. lata, interiora angustiora. *Corolla* alba, superne leviter ampliata, faucibus vix constrictis, 1.6-2.3 cm. longa cum segmentis rotundatis ad 2 mm. *Antherae* inclusae, lineares, subacutae, ad 3 mm. longae, lobis ad basin distinctis parallelis vel leviter divergentibus, anguste breviterque cristatae, poro dimidium lobi aequante. *Ovarium* sub-turbinatum, 4-loculare, sat profunde 8-lobatum, glabrum ; stylus demum per 2 mm. exsertus, superne ampliatus ; stigma capitellatum.

SOUTH AFRICA. Ceres Div.? obtained at the Ceres Wild Flower Show, Sept. 1924, *Marloth* 6223; Cape Town Wild Flower Show, *Bolus Herbarium*, No. 19,253 (type).

1286. **Symplocos subolivacea** W. R. Price [Symplocaceae]; *S. sinuatae* Brand affinis, sed foliis coriaceis acutis, costis supra impressis, spicis multifloris differt.

Arbor 3-metralis; ramuli glabri, annotini subteretes, griseo-brunnei, hornotini obtuse angulati, olivaceo-brunnei. *Folia* coriacea, oblongo-lanceolata, acuta, basi late cuneata, minute denticulata praesertim supra medium, denticulis fere ad glandulas redactis, 10–14 cm. longa, 3.5–4.5 cm. lata, glaberrima, supra brunneo-olivacea, subtus pallidiora olivaceo-viridia, costa supra impressa, subtus elevata, nervis utrinsecus 7–10 elevatis; petioli canaliculati, 1–1.5 cm. longi. *Spicae* axillares, plerumque basi ramosae, multiflorae, densae, 2 cm. longae, 2.5 cm. latae, axibus bracteis bracteolisque hirsutis; bractee et bracteolae ovatae, acutae, 2–4 mm. longae, 1–2 mm. latae. *Flores* glabri. Calyx 4-lobus, 2.5 mm. longus, 2 mm. latus, lobis late ovatis obtusis 1 mm. longis 1.25 mm. latis. *Corolla* 4 mm. longa, alba, tubo brevissimo, lobis 5 oblongo-ovatis acutis 3 mm. longis 1.75 mm. latis demum patentibus. *Stamina* circiter 25, pentadelphia, corollam paullo excedentia, 5 mm. longa, filamentis filiformibus glabris, antheris subglobois. *Ovarium* dense villosum; stylus glaber, 3.5 mm. longus, stamina subaequans. *Bacca* cum calyce persistente obpyriformis, 5.5 mm. longa, 4 mm. diametro, glabra.

CHINA. Western Fukien: top of pass between Lung-yen and Eng-hok, 900 m., Sept. 22, 1912, W. R. Price 1142.

1287. **Caralluma tessellata** Pillans [Asclepiadaceae]; affinis *C. Hottentotorum* N. E. Br. sed caulibus espinosis facile distinguitur.

Caules erecti, basi decumbentes, interdum procumbentes, usque ad 1 dm. alti, 1–1.3 cm. lati, plerumque plus minusve curvati, basi parce ramosi, subcylindrici, longitudinaliter sulcati, obtusissime 6-angulati, angulis sulcis transversis in areolas 4-vel 6-angulatas subprominentes divisus, unaquaque areola folio rudimentario papilliformi minuto instructa, glabri, viridissimi, obscure cineraceo-maculati. *Fasciculi* 2–5-flori, e sulcis longitudinalibus prope apices caulium orti. *Flores* singulatim vel plures simul expansi. *Pedicelli* adscendentes, 4–5 mm. longi, glabri. *Sepala* 2 mm. longa, ovato-lanceolata, acuta, glabra. *Corolla* 8–9 mm. diametro, extra glabra, lobis 3–4 mm. longis leviter reflexis apice recurvatis ovatis acutis supra convexis purpureis praeter apices marginesque papillis breviter aristatis instructis. *Discus* circiter 1 mm. latus, convexus, ciliis brevibus papilliformibus instructus, pallide viridis, purpureo-maculatus. *Tubus* circiter 1 mm. longus, ore 2 mm. lato intus levi ciliis paucis papilliformibus praedito. *Corona exterior* circiter 1 mm. alta, 2 mm. lata, cupuliformis, vitellina, lobis erecto-patentibus transverse oblongis profunde emarginatis, dentibus obtusis vel rarius

acutis, sinibus obtusis. *Coronae interioris* lobi circiter 1 mm. longi, lineari-oblongi, obtusi, vitellini, antheris incumbentes, leviter recurvati.

SOUTH AFRICA. Van Rhynsdorp Div.; near road between Zout River and Nieuwerust, *P. Ross Frames* in Nat. Bot. Gardens, Kirstenbosch, 198/31.

1288. **Quercus lodicosa** E. F. Warburg [Cupuliferae]; affinis *Q. lanatae* D. Don, quae differt foliis latioribus minus acutis, nervis paucioribus (9-14), dentibus paucioribus grossioribus, cupulis multo minoribus minus crassis, glandibus tomentosioribus.

Arbor 15-20 m. alta. *Ramuli hornotini* dense lanati, lana dilute rubiginosa, *annotini* glabri, griseo-brunnei, lenticellis inconspicuis. *Stipulae* ovatae, usque 4 mm. longae, brunneae, membranaceae. *Foliorum laminae* ellipticae vel ovato-ellipticae, basi subinaequales, cuneatae vel leviter rotundatae, apice acutae et breviter acuminatae, 7-14 cm. longae, 3-5 cm. latae, serratae (basi per 2-3 cm. integrae), nervis utrinque 14-18 curvatis in dentes desinentibus; juniores utrinque dense lanatae, lana dilute rubiginosa, adultae supra glabrae (costa basi interdum excepta), nervis leviter impressis, subtus dense lanatae, lana dilute rubiginosa, nervis glabris prominentibus (costa basi tomentosa). *Petioles* 1-2 cm. longi, tomentosi, demum fere glabri. *Amenta mascula* circiter 4.5 cm. longa, rhachi involucrisque tomentosis, antheris leviter exsertis. *Flores feminei* 1-3, subsessiles, involucri tomentoso, stylis linearibus. *Fructus* (unicus) sessilis, *Cupula* patelliformis, 2-2.5 cm. diametro, 2 mm. crassa, intus rufo-tomentosa, squamis ovatis tomentosis crassis confertis laxe adpressis. *Glans* (forma ignota) apice leviter tomentosa.

S. E. TIBET. In forest along the ridge above Gampo Ne, Tsangpo Gorge, at 6000 ft., Dec. 19th, 1924, *F. K. Ward* 635 (type).

N. E. UPPER BURMA. Htawgaw Bum, north of Htawgaw (26° 10' N., 98° 25' E.), 7000-8000 ft., June 1924, *Forrest* 24,554; mixed forests (26° 23' N., 98° 48' E.), 10,000 ft., Nov. 1924, *Forrest* 25,405; mixed forests (26° N., 98° 25' E.), 8000 ft., May 1925, *Forrest* 26,611 (from which the flowers are described).

1289. **Quercus suchiensis** E. F. Warburg [Cupuliferae]; a plerisque speciebus seriei (*Reticulatae*) cupulae squamis adpressis basi incrassatis, foliis majoribus differt. Inter species foliis magnis insignes, *Q. innuncupata* Trel. foliis ellipticis vel obovato-oblongis, *Q. conglomeraata* Trel. et *Q. decipiens* Mart. et Gal. cupulae squamis tenuibus laxis, *Q. Purpusii* Trel. foliis minoribus, cupulis majoribus solitariis, *Q. rhodophlebia* Trel. squamis tenuibus vel carinatis, foliis minoribus nervis dilute rubris costa glabrescente, differunt.

Arbor. *Ramuli* dilute brunnei, leviter sulcati, 4-5 mm. diametro, lenticellis prominentibus. *Gemmae* brunneae, ovoideae, pubescentes, 2×3 mm. *Folia* obovata, 10-17 cm. longa, 6-11 cm. lata, apice obtusissima, basi cordata vel subcordata, ? semipersistentia, parcesime nec profunde crenata, crenulis breviter mucronatis,

nervis 8-10-jugis in plurimas venulas prope marginem divisis supra impressis subtus prominentibus, supra dilute viridia, costa leviter pubescente excepta glabra, subtus pallidiora, glauca, praecipue in nervis laxe rubiginoso-stellato-pubescentia. *Petiolii* puberuli, 4-7 mm. longi, circiter 3 mm. lati, supra plani, subtus teretes. *Stipulae* caducae. *Flores* ingoti. *Fructus* anno primo maturacentes, sessiles, 1-3 ad extremitatem pedunculi conferti (2 vel 3 interdum aborti); pedunculi 5-13 cm. longi, 2-3 mm. diametro. *Cupulae* hemisphaericae, 1.5-1.7 cm. diametro, crassiusculae, intus dense pubescentes, squamulis dilute brunneis basi incrassatis pubescentibus apice subacutis glabris fuscioribus stricte adpressis. *Glans* ellipsoidea, 2-2.5 cm. longa, intus et extra glabra.

MEXICO. Suchi, on the borders of the states of Mexico and Michoacán, 3000 m., Feb. 1832, R. Heatley.

1290. ***Tainia quadriloba*** Summerhayes [Orchidaceae]; affinis *T. Dunnii* Rolfe, a qua statura majore, sepalis petalisque angustioribus, labelli ungue multo angustiore lobo intermedio valde retuso bilobulo distinguitur.

Herba terrestris, radicibus multis flexuosis pubescentibus. *Pseudobulbi* approximati, anguste cylindrici, sursum sensim angustati, 3-4 cm. longi, 5-9 mm. diametro, apice monophylli. *Folia* e petiolo circiter 4-5 cm. longo elliptico-lanceolata, acuta, basi angustata, 25-30 cm. longa, medio 3 cm. lata. *Scapus* e basi pseudobulbi ortus, erectus, 60-80 cm. altus, apice circiter 10-florus, inferne cataphyllis paucis vaginantibus instructus. *Racemus* 7-12 cm. longus; bractee parvae, lanceolatae, acutae, reflexae, 3-5 mm. longae. *Flores* suberecti, flavi. *Sepala* et *petala* similia, falcitim lineari-ligulata, subacuta; sepalum intermedium 12-14 mm. longum, 1-1.25 mm. latum; sepalum laterale 9 mm. longa, 1.25 mm. lata; petala 12-13 mm. longa, 1.75 mm. lata. *Labellum* ex ungue anguste cuneato 3 mm. longo ambitu quadratum, quadrilobum (vel trilobum lobo intermedio bilobulo), totum 9 mm. longum, 6.5-7 mm. latum; lobi laterales ovato-triangulares, obtusi, 1.5 mm. longi; lobus intermedius bilobulus, 3 mm. longus, 5-5.5 mm. latus, lobulis oblique fere orbicularibus antice truncatis sinu rotundato sejunctis; labelli discus inferne carinis duabus satis altis laevibus superne carinis tribus humilibus apice paulo altioribus intermedio lateralibus paulo longiore fere usque ad apicem labelli instructus. *Columna* gracilis, incurvata, 6-6.5 mm. longa. *Pedicelli* cum ovario 1-1.5 cm. longi.

CHINA. Kwangtung, Lung Ta'u Shan, Iu village, in a ravine to left, growing on rock, May 29th, 1924, *Lingnan Univ. Herb. (To & Ts'ang)* 12,246.

A striking species, characterized chiefly by the very broad bilobed middle lobe of the lip, which thus appears almost equally 4-lobed. This specimen was kindly sent to Kew by Dr. Metcalf, of Lingnan University.

XXIV—ADDITIONS TO THE FLORA OF BORNEO AND
OTHER MALAY ISLANDS : IV.* H. N. RIDLEY.

SAPINDACEAE.

Otophora latifolia Ridley, sp. nov. ; *O. erythrocalyci* Hiern affinis, sed foliis longioribus, floribus et fructibus multo minoribus, antheris sericeis differt.

Frutex vel arbor parva. *Folia* usque ad 7-jugata, petiolo 19 cm. longo glabro. *Foliola* alterna vel subopposita, subcoriacea, elliptico-lanceolata, breviter acuminata, basi cuneata, 35 cm. longa, 10 cm. lata ; nervi usque ad 6-pares, subtus elevati, nervi secundarii et reticulationes subtus conspicui ; petioluli crassi, transversim rugosi, 1 cm. longi. *Panicula* elongata, glabra, 37 cm. longa, rhachide obscure angulata, ramis strictis gracilibus, inferioribus 18 cm. longis. *Flores* parvi, glomerulati, plurimi, glabri. *Pedicelli* 3 mm. longi. *Sepala* 4, rotundata. *Petala* 4, obovata, multo minora. *Stamina* 8, antheris oblongis sericeis. *Pistillum* glabrum, oblongum, stigmate sessili. *Drupae* ellipticae, glabrae, subcomplanatae, 8 mm. longae. *Semina* 1 vel 2, ovoidea, 7 mm. longa.

BRITISH NORTH BORNEO. East Coast, *Creagh* (type) ; Sandakan, Myburgh Province, *Elmer* 20, 138 ; and probably also Mt. Kalawat, *Mrs. Clemens* 11, 175.

This plant, apparently confined to the Sandakan district of Eastern Borneo, is closely allied to *O. erythrocalyx* Hiern of the Malay Peninsula. The leaves, however, are very much longer than any I have seen of that species, the flowers and fruits are much smaller, and the anthers are silky.

Otophora macrocarpa Ridley, sp. nov. ; ab *O. erythrocalyce* Hiern, cui affinis, foliolis ferme sessilibus minoribus, panicula minore, floribus multo minoribus differt.

Frutex vel arbor parva. *Folia* 11-jugata, 30 cm. longa, rhachide hirta. *Foliola* alterna vel subopposita, lanceolata, acuminata, basi obliqua obtusa, 6-15 cm. longa, 3-4.5 cm. lata, costa subtus elevata parce hirta, nervis 7-8-paribus procul a margine inarcuantibus ; petioluli incrassati, nigri, hirti ; stipulae rotundatae, cordatae, 1 cm. longae. *Paniculae* ramosae, pubescentes, 15-30 cm. longae, ramis patentibus usque ad 20 cm. longis. *Flores* parvi, in glomerulos distantes congesti, pedunculis 2-3 mm. longis. *Sepala* 5, rotundata, glabra. *Petala* 5, multo minora, oblonga, basi hirta. *Stamina* 8, antheris oblongis marginibus albo-sericeis. *Pistillum* ovoideum, stigmate capitato. *Drupa* globosa, glabra, 3 cm. longa.

BORNEO : Sarawak, Kuching, *Haviland* 67 (type), 917, 1847, 2138.

Haviland describes this both as a shrub and as a small tree. It is a very floriferous species, with small flowers and a large, globular, smooth fruit.

*Continued from *K.B.* 1931, 499.

Nephelium glabrum Bl.

BORNEO. Sarawak, *Haviland & Hose* 3372.

This is not previously recorded from Borneo. It is common in the Malay Peninsula and Java.

Nephelium sufferrugineum Radlk.

BORNEO. Sarawak: near Kuching, *Haviland* 2194 and 2277: "flowers white."

This is also an addition to the Bornean flora. In the Flora of the Malay Peninsula I retained this plant as a variety of *N. glabrum* Bl., but it is clearly a good species, for the fruits collected by Haviland are totally unlike the smooth ones of that species, being covered with long, bristle-like processes with curved, not muricate, tips rising from dilated bases much like those of *N. lappaceum*, but the drupe is only 2 cm. long.

Nephelium obovatum Ridley, sp. nov.; foliis trifoliolatis, foliolis coriaceis obovatis, paniculis racemiformibus densifloris axillaribus ab omnibus congeneribus distinctum.

Arbor, ramis superne pubescentibus. *Folia* trifoliolata; petioli 2 cm. longi. *Foliola* obovata, apice rotundata, basi angustata, 5-8 cm. longa, 3.5-4 cm. lata, coriacea, supra glabra, reticulata, subtus in costis hirta, nervis subtus prominentibus 7-paribus; petioluli crassi, hirti, 3 mm. longi. *Paniculae* racemiformes, densiflorae, plures, axillares, 4.5 cm. longae, hirtae. *Bracteeae* lanceolatae, acutae, hirtae. *Pedicelli* 1 mm. longi. *Calyx* cupulatus, lobis 5 triangularibus acutis hirtis. *Petala* 5, paullo minora, lanceolata. *Stamina* 8, filamentis gracilibus 3 mm. longis basi hirtis. *Ovarium* (*abortivum*) hirtum.

BORNEO. Sarawak: near Kuching, *Haviland* 2275: "Large tree, flowers sweet-scented."

I have seen only male flowers of this remarkable tree, which is very distinct from all others known in its trifoliolate leaves, with stiff, obovate leaflets, its short, dense panicles with very numerous flowers on very short branches, lanceolate petals and hairy ovary.

Nephelium Hosei Ridley, sp. nov.; a *N. costato* Hiern, cui affine, foliis tenuioribus glabris, sepalis subacutis nec rotundatis differt.

Arbor. *Folia* glabra, 30 cm. longa. *Foliola* 8, lanceolata, acuminata, 16 cm. longa, 5-5.5 cm. lata, basi inaequaliter cuneata, subcoriacea, nervis 14-paribus secundariis conspicuis tenuibus; petioluli 5 mm. longi. *Paniculae* elongatae, 30 cm. longae, pubescentes, ramis 15 cm. longis vel brevioribus. *Pedicelli* breves, 2 mm. longi. *Sepala* 5, ovata, subacuta vel rotundata, pubescentia. *Petala* nulla. *Stamina* 3 mm. longa, filamentis basi hirtis. *Discus* hirtus. *Drupae* oblongae, binae, 1.5 cm. longae, papillis conicis textae, in disco hirtis insidentes, sepalis accrescentibus 3 mm. longis.

BORNEO. Sarawak: Baram, *Hose* 124 (type); Matang road woods, *Ridley*.

I believe that my plant from the Matang road woods is the same as Hose's plant, but it is in fruit only. The leaves are quite similar, but glaucous beneath, the panicle elongated and stouter, the pedicels short and stout, but the disc is hairy, as it is in Hose's specimen.

The species is very nearly allied to *N. costatum* Hiern of the Malay Peninsula, but the leaves are much thinner and the sepals are thicker, rounded and velvety. From *N. Beccarianum* Radlk. it differs in the hairy leaves and very hairy panicles, which are also much smaller.

Pometia alnifolia Teysm. *Irina alnifolia* Bl. and *I. tomentosa* Bl.

I cannot distinguish Blume's *Irina tomentosa* from his *I. alnifolia*. The difference he gives is that in *I. tomentosa* the leaves are more rounded and subcordate at the base than in *I. alnifolia*, but I find cuneate-based leaves along with round-based ones on the same plant. The tree, in fact, varies very much in foliage. It is sometimes quite glabrous, as in a co-type collected by Korthals in Sumatra, while in other specimens the branchlets and leaves are densely velvety-hairy. A tree I found on Mt. Matang, Sarawak, has leaves gradually narrowed to the base, but the petioles, costa on both sides and leaf rhachis are bristly-hairy. Haviland obtained, near Kuching (no. 2260), a form in which the leaflets are narrowed or rounded at the base and densely, softly tomentose beneath.

Paranephelium nitidum King.

BRITISH NORTH BORNEO. Balambangan island, Wood 1757: "A tree twenty-five feet tall, in forest,"

Not recorded from Borneo before. It occurs in Sumatra and the Malay Peninsula.

Mischocarpus sundaicus Bl.

BRITISH NORTH BORNEO. Sandakan, a stout form from the East Coast, Creagh.

This common plant has not before been recorded from Borneo.

Harpullia confusa Bl.

DUTCH BORNEO. Bangermasin, Motley 1143: "A large tree; flowers white."

This plant has been confused by Merrill and other botanists with the very different Indian shrub *H. cupanioides* Roxb. It is common in the Malay Peninsula and Java. *H. juglandifolia* Bl. seems to me to be the same plant.

Harpullia tomentosa Ridley, sp. nov.; ab *H. confusa* Bl., cui affinis, foliis et ramis velutinis, floribus masculis multo majoribus, petalis tenuibus spathulatis differt.

Arbor tomentosa. *Folia* 15 cm. longa, petiolis et rhachide velutinis. *Foliola* alterna, usque 8, lanceolata, apice abrupte acuminata, obtusa, basi obtusa, 10-12 cm. longa, 3.5-4 cm. lata, membranacea, supra glabra, subtus in nervis hirta, nervis 10-11-paribus subtus elevatis cum costa hirta-barbatis; petioluli 2 mm. longi,

hirti. *Paniculae masculae* breves, velutinae. *Pedicelli* 1.5 cm. longi, imbricati, velutini. *Sepala* 5, imbricata, elliptica, apice rotundata, 1 cm. longa, velutina. *Petala* 5, spathulata, basi linearia, hirta, apice sensim dilatata, 3 mm. lata. *Stamina* subaequilonga, antheris curvis oblongis. *Pistillodium* dense hirtum, disco circulari undulato pubescente. *Flores feminei* atque *fructus* non visi.

BORNEO. Sarawak: Mt. Braang, limestone, alt. 150 m., *Haviland* 2232.

Clearly allied to *H. confusa* Bl., but very distinct in the red, velvety pubescence of the inflorescence and branches. On the leaves the hairs are confined to the midrib and nerves. They are very numerous, pale, and close-set in tufts. The inflorescences in the only specimen are but 5 cm. long. Normally I expect they are longer. The flowers are much larger than those of *H. confusa* Bl., and their petals are nearly as big as those of *H. cupanioides* Roxb.

SABIACEAE.

Meliosma grandifolia Lecomte in Bull. Soc. Bot. Fr. liv. 676 (1909).

This name is antedated by Urban for a Mexican species (published 1895), so I propose the name **M. sarawakensis** Ridley, nom. nov., for the Bornean plant. It is not uncommon in SARAWAK: *Beccari* 3572; Rock Road, *Haviland* 742; Old Jungle Conglomerate, *Haviland* 763; Matang, *Ridley*. *Haviland* says that his No. 742 was a climber, but my plant was a tree, with red calyces and white petals. A specimen from Limbang (*Haviland* 787) has larger leaflets than usual, hairy on both sides, but apparently from a young plant.

Meliosma latifolia Ridley, sp. nov.; a *M. nitida* Bl., cui affinis, foliolis tenuioribus ovatis magnis, nervis et rhachide hirsutis, floribus hirtis distincta.

Arbor. Folia magna, rhachide rufo-velutina. *Foliola* ovata, acute acuminata, basi lata, brevissime inaequilateralia, acuta. 18–20 cm. longa, 7.5–10 cm. lata, supra glabra, nervis et costa exceptis, subtus nervis elevatis 8-paribus cum costa rufo-hirsutis; petioluli crassi, rufo-velutini, 1 cm. longi. *Panicula* 36 cm. longa (pedunculo 14 cm. longo incluso), ramis dissitis 5.5 cm. longis omnino rufo-hirtis. *Flores* sessiles. *Sepala* lanceolata, acuta, hirta. *Petala* ovata, hirta. *Stamina* 2, hirsuta. *Stylus* sepalis longior, glaber.

BORNEO. Sarawak: *Haviland & Hose* 3627.

A very distinct species in its large, broadly ovate leaflets, hairy on the nerves. The one specimen is incomplete, as there is only a portion of the large leaf with distinct leaflets, and the flowers are nearly over.

ANACARDIACEAE.

Rhus perakensis King.

BORNEO. Sarawak: near Bau and Kuching, *Haviland* 70, 1965; *Haviland & Hose* 3366; Baram, *Hose* 263: "Flowers green."

This plant has not previously been recorded for Borneo.

***Mangifera odorata* Griff.**

BRITISH NORTH BORNEO. Marinsinsing, Marudu Bay, *Fraser* 256.

***Mangifera foetida* Lour.**

BORNEO. Sarawak: *Beccari* 3564, 3565.

***Mangifera longipes* Griff.**

BORNEO: Sarawak: *Beccari* 2655.

***Mangifera sclerophylla* Hook. fil.**

BORNEO. Sarawak: near Kuching, *Haviland* 2079.

None of these species of *Mangifera* has been previously recorded for Borneo. The first two are commonly cultivated fruit trees and are doubtless carried about by Malays.

***Mangifera Beccarii* Ridley**, sp. nov.; a *M. Griffithii* Hook. fil., cui affinis, foliis basi obtusis, panícula multo longiore et laxiore, ovario disco trilobo circumdato differt.

Arbor. *Folia* elliptica, obtuse cuspidata, glabra, basi rotundata, 7-10 cm. longa, 3-5 cm. lata, coriacea, costa crassa utraque pagina elevata, nervis 11-paribus subtus elevatis; petioli crassi, 1 cm. longi. *Paniculae* plures, terminales, puberulae, laxae, 22 cm. longae. *Flores* in glomerulos dissitos congesti. *Pedicelli* 2 mm. longi, pubescentes. *Sepala* 4, lanceolata, pubescentes. *Petala* 4, alba, linearia, glabra, 1 mm. longa. *Stamen* unicum. *Stylus* petalis aequilongus. *Discus* trilobus, lobis rotundatis cum petalis alternantibus.

BORNEO. Sarawak: *Beccari* 3079.

This is closely allied to *M. Griffithii* Hook. fil. of the Malay Peninsula, but differs in the leaf-bases being rounded, not cuneate, in the stronger elevated nerves and midrib, the long spreading panicle branches and in the three-lobed disc entirely surrounding the ovary.

***Mangifera Havilandi* Ridley**, sp. nov.; *M. longipetiolatum* King approximatus, sed paniculis brevibus compactis, foliis ellipticis minoribus, sepalis multo brevioribus, petalis angustioribus distincta.

Arbor glabra. *Folia* remota, elliptica, acute cuspidata (cuspidate 1 cm. longa), basi acuminata, 10-15 cm. longa, 3.5-5.5 cm. lata, coriacea, nervis gracilibus 8-9-paribus, costa supra elevata subtus crassa elevata, reticulationibus parvis conspicuis; petioli graciles, 3-3.5 cm. longi. *Paniculae masculae* laxae, 9-10 cm. longae, ramis 4 cm. longis paucis dissitis glabris. *Pedicelli* graciles, 2 cm. longi. *Sepala* 4, ovata, acuminata, marginibus minute ciliatis. *Petala* 4, lanceolata, acuta, alba, 3 mm. longa. *Stamen* unicum, filamentum cylindricum acuminatum, anthera oblonga atra. *Discus* carnosus, circularis, lobulatus. *Flores feminei* non visi.

BORNEO. Sarawak: near Kuching, *Haviland & Hose* 3368: "Small tree; petals white; stamen one."

This is perhaps nearest to *M. longipetiolata* King, but the panicles are smaller and the pedicels shorter.

Buchanania fragrans Ridley, sp. nov. ; a *B. splendens* Miq., cui affinis, paniculis densis, foliis brevioribus, sepalis ovatis obtusis, gynaeceo hirto differt.

Arbor, ramulis novellis et perulis dense velutinis. *Folia* obovata, 11–14 cm. longa, 5.2–6 cm. lata, rigide coriacea, glabra, supra fusca, subtus castanea (siccitate), basi acuminata, nervis 10-paribus gracilibus elevatis ; petioli crassiusculi, 1 cm. longi. *Paniculae* multiflorae, densae, foliis breviores, 6–12 cm. longae, ramis 2–3 cm. longis rhachidibus pubescentibus. *Flores* albi, fragrantis. *Pedicelli* 1 mm. longi, pubescentes. *Sepala* glabra, ovata, obtusa. *Petala* oblonga, obtusa, 2 mm. longa. *Stamina* 8, filamentis linearibus petalis brevioribus, antheris terminalibus oblongo-ovatis glabris. *Discus* cupuliformis, 10-lobus. *Carpella* 5, hirta.

BORNEO. Sarawak : near Kuching, *Haviland* 1659 : “ Tree ; flowers white, somewhat scented.”

var. ***oblanceolata*** Ridley, var. nov. foliis tenuioribus oblanceolatis basi longe acuminatis apice breviter acuminatis 12–18 cm. longis 4.5–5 cm. longis, paniculis densis 9–12 cm. longis.

BORNEO. Sarawak : near Kuching, *Haviland* 903 : “ Small tree ; flowers white, disc ten-lobed, carpels 4 or 5, one only ovule-bearing.”

This variety closely resembles the type in every point but the leaves. The species is apparently most nearly allied to *B. splendens* Miq. (of which, however, I have seen no specimens), but differs in its dense panicle and hairy ovary.

Buchanania glaberrima Ridley, sp. nov. ; *B. arborescenti* Bl. affinis sed omnino glaberrima, pedicellis longioribus, calycis lobis brevioribus.

Arbor, omnino glabra. *Folia* obovata, obtusa vel rotundata, basi in petiolos decurrentia, 8–11 cm. longa, 3–6 cm. lata, rigide coriacea, nitida, nervis 9-paribus utrinque elevatis tenuibus, secundariis et reticulationibus conspicuis elevatis ; petioli basi incrassati, transversim rugosi, 1 cm. longi. *Paniculae* 10 cm. longae, glabrae, ramis 1–1.5 cm. longis. *Pedicelli* 2–3 mm. longi. *Sepala* brevia, rotundata. *Petala* oblonga, obtusa, 2 mm. longa. *Stamina* 10, filamentis linearibus apice acuminatis 1 mm. longis, antheris oblongis sagittatis. *Discus* cupuliformis, margine obscure denticulatus. *Carpella* 3–4, glabra.

BORNEO. Labuan, *Creagh*.

This species is perhaps nearest to *B. arborescens* Bl., but is completely glabrous.

Buchanania aruensis Ridley, sp. nov. ; a *B. molli* Lauterb., cui affinis, foliis oblanceolatis laminis ad bases petiolorum decurrentibus differt.

Arbor, ramis novellis validis dense molliter hirtis. *Folia* oblanceolata, laminis ad bases petiolorum decurrentibus, apice breviter (5 mm.) acute cuspidata, 18–20 cm. longa, 5·5–7 cm. lata, subcoriacea, supra glabra, subtus nervis 20-paribus cum costa et reticulationibus hirtis; petioli dorso velutino-hirti, 1·5 cm. longi. *Paniculae* 9 cm. longae, dense hirtae. *Pedicelli* 1 mm. longi, hirti. *Sepala* ovata, acuta, dorso hirta, 1 mm. longa. *Petala* glabra, 2 mm. longa, lineari-oblonga. *Staminum* filamenta filiformia, glabra, antheris oblongis longe sagittatis. *Discus* brevis, glaber, undulatus. *Carpella* 3–4, basi dense hirta.

ARU ISLANDS. Giabu-Lengan, 1873, *Beccari*.

This tree appears to be nearest to *B. mollis* Lauterb., of New Guinea, of which I have been unable to see a specimen. The foliage of *B. aruensis*, however, is totally different, the oblanceolate lamina of the leaves being decurrent to the base of the petiole.

Gluta laxiflora Ridley, sp. nov.; a *G. elegante* Hook. fil., cui affinis, foliis longioribus angustioribus, nervis subtus elevatis, panícula laxiflora, floribus minoribus minute puberulis, gynophoro multo brevior differt.

Arbor glabra. *Folia* lanceolata vel oblongo-lanceolata, cuspidato-acuminata, basi angustata, 13–20 cm. longa, 3·5–5 cm. lata, coriacea, nervis 17-paribus subtus elevatis; petioli 3 cm. longi, graciles, basi 1 cm. incrassati. *Panicula* laxa, pauciflora, 10 cm. longa, ramis gracilibus puberulis. *Pedicelli* 4 mm. longi. *Calyx* spathaceus, bilobus, 4 mm. longus, lobis obtusis. *Petala* 9 mm. longa, oblongo-linear, apice recurva, dorso puberula. *Stamina* paullo longiora, filamentis gracilibus subaequilongis. *Ovarium* oblongo-globosum, gynophoro 2 mm. longo.

BORNEO. Sarawak: Baram river, *Hose* 185.

This is undoubtedly allied to *G. elegans* Hook. fil., of Penang Hill, but differs in the longer, narrower leaves with strongly elevated nerves beneath, in the smaller flowers, and in the branches of the panicle, the calyx, and the backs of the petals being minutely scurfy-puberulous.

Melanorrhoea tricolor Ridley, sp. nov.; a *M. aptera* King, cui affinis, foliis multo minoribus petiolatis nervis paucioribus, petalis ferme glabris nec sericeo-velutinis differt.

Arbor magna, glabra. *Folia* obovata, apice rotundata, basi acuminata, 7–11 cm. longa, 4–5 cm. lata, rigide coriacea, costa nervisque 12-paribus subtus elevatis reticulationibus minutis conspicuis; petioli 2·5 cm. longi, basi incrassati. *Racemi* validi, 11–13 cm. longi. *Flores* majusculi, dissiti. *Pedicelli* validi, 2 cm. longi. *Alabastra* elliptico-ovoidea, 1 cm. longa. *Calyx* calyptrotum deciduus, flavus. *Petala* oblanceolata, obtusa, extra sericea, 1·2 cm. longa, 4 mm. lata, alba. *Stamina* plurima, rosea, 1 cm. longa, filamentis gracilibus sericeis. *Gynophorum* 4 mm. longum. *Ovarium*

parvum, subglobosum, stylo 5 mm. longo. *Drupa* immatura obovoidea (petalis deciduis).

BORNEO. Sarawak: near Kuching, *Haviland* 2231: "Large tree; calyx yellow, petals white, pink at the base, stamens pink."

Allied to *M. aptera* King, but the leaves are much smaller, not sessile, and have many fewer nerves, and the petals are only thinly silky outside.

Melanorrhoea speciosa Ridley, sp. nov.; a *M. tricolori* Ridl., cui affinis, floribus paniculatis, foliis subtus et inflorescentia hirtis differt.

Arbor magna, ramis hirtis. *Folia* obovata, apice lata, rotundata, emarginata, basi acuta, 7–9 cm. longa, 4–6.5 cm. lata, valde coriacea, supra glabra, subtus costa nervisque 15-paribus elevatis hirtis albescentibus; petioli crassi, hirti, 2 cm. longi. *Paniculae* validae, hirtae, pauciramosae, 18 cm. longae, ramis 3–6 cm. longis. *Flores* majusculi. *Pedicelli* hirti, 1 cm. longi. *Alabastra* conico-ellipsoidea, 1 cm. longa. *Calyx* calyptriati deciduus, hirtus. *Petala* oblonga, obtusa, alba, basi rubra, extra sericeo-hirta, 1.4 cm. longa, 4 mm. lata. *Stamina* plura, rosea, filamentis hirtis 1 cm. longis. *Ovarium* sericeo-hirtum, gynophoro 4 mm. longo.

BORNEO. Sarawak: near Kuching, *Haviland* 3147: "Large tree; petals white, base red, stamens pink."

This resembles *M. tricolor* Ridl., but is very hairy, and the flowers are arranged in panicles and not in simple racemes.

Nothopegia borneënsis Ridley, sp. nov.; nulli speciei arcte affinis, foliis majusculis ellipticis crassis, paniculis axillaribus glabris, floribus globosis parvis distincta.

Arbor. *Folia* elliptica vel oblanceolato-elliptica, brevissime et obtuse cuspidata, basi obtusa vel rotundata, 11–14 cm. longa, 5–6 cm. lata, coriacea, supra glabra, costa obscure puberula excepta, nervis 21-paribus parallelis elevatis, reticulationibus subtus crassis elevatis puberulis; petioli 2 cm. longi, incrassati, hirti. *Paniculae* plures, axillares, graciles, parce et breviter ramosae, pubescentes, hirtae, 5–8 cm. longae. *Bractae* 2 mm. longae, lanceolatae, hirtae. *Flores* sessiles, globosi, 2 mm. longi. *Calyx* globosus, lobis 4 ovatis acutis. *Petala* vix longiora, ovata, acuta, intus hirta. *Stamina* minuta. *Ovarium* hirtum.

BORNEO. Sarawak: *Beccari* 241.

I take this to be a species of *Nothopegia* as it has the characteristic foliage and inflorescence. The interior of the small flowers is hairy, as is the ovary. The foliage is quite like that of *Melanochyla*, the inflorescence nearly glabrous and the petals short and rounded. The genus has not been previously recorded from Borneo, the other species being natives of India and Ceylon.

Camptosperma squamatum Ridley, sp. nov.; a *C. auriculato* Hook. fil., cui affine, foliis minoribus conspicue reticulatis, panicula racemiformi squamis tecta differt.

Arbor. *Folia* lanceolata, obtusa, basi angustata, 10–14 cm. longa, 4–5.5 cm. lata, nervis 13-paribus tenuibus paullo elevatis, reticulationibus parvis conspicuis; petioli 1–2 cm. longi, supra canaliculati, basi auriculati. *Paniculae* racemiformes, squamatae, 12 cm. longae, ramis 2 mm. longis vel brevioribus. *Flores* parvi, sessiles. *Calyx* 4-lobatus, lobis brevibus rotundatis. *Petala* ovata, subacuta, 1 mm. longa. *Stamina* 9, subaequilonga, filamentis linearibus. *Ovarii* rudimentum in disco magno immersum.

BORNEO. Sarawak: near Kuching, *Haviland & Hose* 3196.

This species has much smaller leaves than most, and they are conspicuously reticulate; the blade is decurrent to the base of the petiole, where it is auricled. The almost simple inflorescences are covered with minute round scales.

Melanochyla axillaris Ridley, sp. nov.; nulli speciei arcte affinis; paniculis brevibus compactis multifloris axillaribus glabrescentibus, calyce obconico puberulo nec lanuginoso ab omnibus congeneribus distincta.

Arbor parva. *Folia* alterna, oblanceolata, obtusa, basi angustata, 22–45 cm. longa, 6–12 cm. lata, valde coriacea, glabra, nervis 21-paribus subtus elevatis subparallelis, reticulationibus subtus conspicuis; petioli validi, 4–6 cm. longi, basi (2–3 cm. longa) valde incrassati, angulati, rufo-velutini. *Paniculae* axillares, densae, multiflorae, 2 cm. longae, ramis puberulis. *Bracteae* 2 mm. longae, lanceolatae, dense hirtae. *Pedicelli* 1 mm. longi, puberuli. *Calyx* gamosepalus, obconicus, 5 mm. longus, purpureo-puberulus, lobis 5 triangularibus acutis. *Petala* 5, lineari-oblonga, utrinque hirta, calyci adnata. *Stamina* 5, alterna breviora, filamentis hirtis, antheris parvis terminalibus. *Ovarium* globosum, hirtum, stylo breviusculo terminali.

BORNEO. Sarawak: near Kuching, *Haviland* 994, 2211, 2284; "Small tree; sepals purple."

This is very different from any other described species in the very short, dense, crowded, axillary panicles which are nearly glabrous. The obconic calyx is longer than in most species and nearly glabrous. The young fruit in one specimen is ovoid, acute and densely red-velvety-hairy.

Melanocommia Ridley, gen. nov.; inter *Melanochylam* et *Semecarpum* intermedia, calyce parvo cupulato 5-dentato, petalis liberis extra hirtis, staminibus 5 extra discum 10-dentatum liberis, ovario hirtio uniloculari, ovulo singulo laterali, stylis 3 elongatis recurvis stigmatibus cordatis ab utroque genere distat.

Melanocommia borneënsis Ridley, sp. nov. (adhuc unica).

Arbor ferrugineo-velutina. *Folia* alterna, elliptica, acuta, basi paullo angustata, 15 cm. longa, 7.5 cm. lata, coriacea, nervis subtus elevatis rufo-hirtis 10-paribus; petioli crassi, 1 cm. longi, rufo-velutini. *Panicula* terminalis, 5 cm. longa, rufo-velutina, ramis 2 cm.

longis. *Bracteae* lanceolatae, obtusae, hirtae. *Calyx* brevis, patelliformis, breviter 5-dentatus, hirtus. *Petala* 5, valvata, triangularia, extra hirta, 5 mm. longa, subacuta. *Stamina* 5, ovario breviora, glabra, extra discum brevem 10-crenatum orta, antheris ovato-cordatis. *Ovarium* globosum, hirtum, uniloculare. *Ovulum* 1, e basi lateraliter enatum, funiculo longo curvato, micropyla infera. *Styli* 3, nutantes, glabri. *Stigmata* biloba.

BORNEO. Sarawak: *Beccari* 3151.

This plant seems intermediate between *Melanochyla* and *Semecarpus*. It has quite the habit of the former, but has a very short corolla and three long styles. The flowers are as big as those of a *Melanochyla*, but the stamens are free to the base and outside the disc, and the three styles more resemble those of *Semecarpus*.

Semecarpus rufo-velutinus Ridley, sp. nov.; *S. velutino* King affinis, sed foliis minoribus ovatis, panicula longiore et laxiore, petalis oblongis multo majoribus distinctus.

Arbor rufo-velutina. *Folia* ovata vel oblonga, cuspidato-acuta, basi obtusa, 14-23 cm. longa, 7-11 cm. lata, coriacea, supra glabra, subtus nervis 18-paribus et costa rufo-hirtis; petioli crassiusculi, 1.2 cm. longi, rufo-velutini. *Paniculae* rufo-velutinae, 29 cm. longae, laxae, multiramosae. *Flores* in glomerulos congesti, sessiles vel brevissime pedicellati. *Bracteae* 1 mm. longae, rufo-hirtae. *Calyx* cupularis, 1 mm. longus, dense hirtus, lobis vix distinctis obtusis. *Petala* oblonga, obtusa, puberula, 2 mm. longa. *Stamina* petalis duplo breviora, antheris conicis majusculis. *Discus* et *ovarium* hirta.

BORNEO. Sarawak: Miri river, *Hose* 652 (type); *Beccari* 3724.

Semecarpus lanceolatus Ridley, sp. nov.; *S. albescenti* Kurz affinis, foliis lanceolatis acuminatis, floribus majoribus distinctus.

Arbor, ramis velutino-hirtis. *Folia* lanceolata, breviter acuta, basi acuminata, 18-21 cm. longa, 3-5 cm. lata, subcoriacea, supra glabra, subtus nervis 18-paribus hirtis elevatis, costa crassiuscula elevata; petioli 1-1.4 cm. longi, incrassati. *Paniculae* laxae, 30 cm. longae, velutinae, ramis dissitis patentibus 11 cm. longis. *Flores* vel singuli vel pauci in glomerulos dispositi, pedicellis hirtis 2 cm. longis. *Calyx* obconicus, hirtus, lobis triangularibus acutis 1 mm. longis. *Petala* 5, lanceolata, acuta, 2 mm. longa, extra sericea. *Stamina* multo breviora. *Ovarium* globosum, hirtum.

BRITISH NORTH BORNEO. Tawan, East Coast, tree near beach, *Creagh*.

Pentaspadon teleianthera Ridley, sp. nov.; a *P. Molleyi* Hook. fil., cui affinis, staminibus omnibus antheriferis, calyce multo minore et petalis vix imbricatis valde distinctus.

Arbor. *Foliola* 3-juga: juniora lanceolata, acuminata, basi subacuta; adulta non visa. *Paniculae* subterminales, pubescentes, 15-21 cm. longae, ramulis dissitis. *Flores* albi, pedicellis gracilibus hirtis 2 mm. longis. *Bracteae* lanceolatae, hirtae. *Calycis* lobi

breves, ovati, acuti, hirti. *Petala* 5, paullum imbricata, oblonga, obtusa, 2 mm. longa. *Stamina* 10, omnia antherifera, filamentis teretibus 2 mm. longis, antheris oblongis. *Discus* brevis, patelliformis, 10-lobus. *Ovarium* glabrum. *Stylus* crassus, sublateralis, stigmatе apice cristato.

BORNEO. Sarawak : Kuching, *Haviland* 2871.

This species differs from *P. Molleyi* Hook. fil., the type species of the genus, in the longer pedicels and very short calyx, but more especially in the fact that all the stamens are antheriferous and apparently fertile, instead of five being abortive. The petals only just overlap at their edges and are not so distinctly imbricate as in the other species. In all other respects it so closely resembles the type species that it is impossible to separate it generically. As it flowers when the leaves are just returning after the leaf-fall, I have seen no adult foliage.

***Parishia borneënsis* Ridley**, sp. nov. ; a *P. insigni* Hook. fil., cui affinis, floribus multo majoribus, sepalis petalisque latis rotundatis, panícula valida, petiolulis brevissimis differt.

Arbor. *Folia* glabra, 18 cm. longa. *Foliola* 9, oblongo-lanceolata subcordata, 7.5-9.4 cm. longa, 4 cm. lata, coriacea, nervis 12-paribus tenuibus utrinque elevatis, reticulationibus conspicuis ; petioluli brevissimi, 3 mm. longi. *Paniculae* plures, 30 cm. longae, rufo-hirtae. *Bractaeae* lanceolatae, obtusae, velutino-hirtae. *Flores masculi* pedicellati, pedicellis 4 mm. longis hirtis. *Calyx* 3 mm. longus, cupulatus, hirtus, lobis 4 lanceolatis. *Petala* 4, vix aequilonga, glabra, rotundata, obovata. *Stamina* 4, filamentis crassiusculis linearibus, antheris conicis. *Flores feminei* et *fructus* non visi.

BORNEO. Sarawak : near Kuching, *Haviland* 2274 : " Tree, male, stamens usually 4."

I have seen only an imperfect leaf of this tree and more fully developed ones may be larger. As is usual in this genus, the tree is unisexual and this specimen was male.

***Parishia polycarpa* Ridley**, sp. nov. ; a *P. insigni* Hook. fil., cui affinis, fructibus vix duplo minoribus ochraceo-pilosis distincta.

Arbor parva. *Folia* 18 cm. longa, rhachidibus glabris. *Foliola* 7, opposita, oblongo-elliptica, breviter acuminata, basi rotundata, 10 cm. longa, 4 cm. lata, coriacea, nervis usque 15-paribus tenuibus inconspicuis parallelis, reticulationibus minutis conspicuis ; petioluli crassi, rugosi, 1 cm. longi. *Flores* non visi. *Panicula frutescens* valida, 20 cm. longa, ramis 5 cm. longis parce ochraceo-tomentosis. *Fructus* globosi, 1 cm. longi, alis sepalinis oblongo-linearibus apice rotundatis dense adpresse ochraceo-pilosis 5 cm. longis 1 cm. latis.

BORNEO. Sarawak : Bergark, 1600 ft., limestone, 4 Jan. 1889, *Haviland* 113 : " Small tree."

This species is remarkable for its rigid, coriaceous leaves with numerous faint, parallel nerves and conspicuous but minute reticulations, and for its yellowish-hairy fruit.

Parishia minor Ridley, sp. nov. ; *P. polycarpae* Ridl. affinis, sed foliis multo minoribus rigidis lanceolatis, alis sepalinis angustis obtusis distincta.

Arbor parva. *Foliorum rhachides* graciles, glabrae. *Foliola* 11, opposita, lanceolata vel oblongo-lanceolata, obtuse acuminata, apice rotundata vel retusa, basi breviter obtuse cuneata, 5-7 cm. longa, 2 cm. lata, glabra, rigide coriacea, nervis tenuibus paullum elevatis parallelis 11-paribus supra inconspicuis, reticulationibus inconspicuis laxis. *Flores* non visi. *Panicula frutescens* 26 cm. longa, validula, ramis 7-15 cm. longis hirtis, ramulis 4 mm. longis dense hirtis. *Drupae* 1.3 cm. longae, ovoideae ; alae sepalinae 4, tenues, lineares, obtusae, 7 cm. longae, 4 mm. latae, juniores pubescentes, adultae glabrae, nervis elevatis pluribus parallelis, venulis anastomosantibus.

BORNEO. Sarawak : near Kuching, *Omar* 368.

This tree is distinct in the very narrow, blunt leaflets, which are small for the genus.

The label mounted with the specimen and number states that the plant is a tree of 20 feet, with a sweet, edible fruit, and that the native name is *Nyatoh Pipit*. This name is Malay for a *Bassia* sp. : it is therefore possible that the label has been misplaced.

Parishia sericea Ridley, sp. nov. ; a *P. Maingayi* Hook. fil., cui affinis, floribus minoribus sericeo-velutinis, foliis subovatis nec oblongis differt.

Arbor. *Folia* glabra, 45 cm. longa ; petioli 14 cm. longi. *Foliola* 15, subopposita, ovato-oblonga, obtuse acuminata, basi rotundata, 8.5-10 cm. longa, 4.1-5.2 cm. lata, coriacea, glabra, nervis primariis 15-paribus tenuibus elevatis, secundariis parallelis tenuioribus ; petioluli crassiusculi, canaliculati et transversim rugosi, 1 cm. longi. *Panicula* laxa, multiflora, 40 cm. longa, dense velutino-hirta, siccitate flavescens. *Bractae* lanceolatae, sericeo-velutinae. *Flores* subsessiles, alabastris globosis sericeo-velutinis. *Calyx* campanulatus, 3 mm. longus, sericeus, lobis 4 brevibus ovatis obtusis. *Petala* linearia, 4 mm. longa, obtusa, glabra. *Stamina* 4, glabra, filamentis crassiusculis teretibus. *Discus* et *pistillodium* hirta.

BORNEO. Sarawak : near Kuching, *Haviland* 2273.

Parishia Lowei Ridley, sp. nov. ; a *P. pubescente* Hook. fil., cui affinis, inflorescentia parce hirta, floribus minoribus, sepalis pubescentibus, foliolorum nervis paucioribus, reticulationibus subtus elevatis differt.

Arbor. *Folia* usque 7-foliolata, rhachide hirtula. *Foliola* oblonga, obtusa vel subacuta, basi rotundata, subcordata, 8-10 cm. longa, 4-4.5 cm. lata, coriacea, supra glabra, subtus hirta, nervis 13-paribus supra depressis subtus elevatis crassiusculis dense hirtis ; petioluli breves vel subnulli. *Paniculae* pauciramosae, hirtulae, 30 cm. longae, ramis 5 cm. longis vel brevioribus. *Flores masculi*

pauci, pedicellis gracilibus 4 mm. longis pubescentibus. *Calyx* breviter campanulatus, pubescens, 2 mm. longus, lobis 4 lanceolatis. *Petala* 4, lanceolata, aequilonga, glabra. *Stamina* 4, filamentis filiformibus, antheris oblongis. *Flores feminei* non visi.

BORNEO. "Kayu Upik," *Lowe*.

***Dracontomelum sylvestre* Bl.**

BORNEO. Sarawak: Kuching, *Haviland* 2751; Rejang Sibü, *Haviland* 2272, 2544; Sarawak river, above Lidah Tana, *Haviland*, "bzld," sine num.; Saribas River, *Haviland* 3182; without precise locality, *Beccari* 923, 2783 and 3518. Dutch Borneo: *Korthals*; Bangermasin, *Motley* 350 (referred by Engler to *D. mangiferum* Bl.): "Second-rate tree; flowers greenish."

This is the commonest species of the genus in Borneo.

***Dracontomelum Cumingianum* Baill.**

BORNEO. Sarawak: on Mt. Matang, Jan. 1915, *Ridley*.

A common Philippine plant, new to Borneo.

***Dracontomelum brachyphyllum* Ridley**, sp. nov.; a *D. sylvestre* Bl., cui affine, foliolis multo minoribus coriaceis, nervis procul a margine inarcuantibus, panícula brevi et rhachide cum foliorum costa atque petiolulis hirtis, differt.

Arbor, ramulis novellis ferrugineo-velutinis. *Folia* brevía, 25 cm. longa, rhachide hirta. *Foliola* 15, subopposita, oblonga, longe acuminata, basi rotundata, inaequilateralía, 5-9 cm. longa, 2-2.5 cm. lata, coriacea, supra nitida, glabra (costa puberula excepta), reticulationibus conspicuis elevatis, subtus pallidiora, nitida, costa praesertim basi hirta, ceterum glabra, nervis 8-paribus subtus elevatis 2 mm. a margine inarcuantibus; petioluli crassi, hirti, 2 mm. longi. *Paniculae* 20 cm. longae, ramis dissitis 2-5 cm. longis furfuraceo-puberulis, pedicellis gracilibus 3 mm. longis. *Sepala* 5, ovata, obtusa, 4 mm. longa, dorso furfuracea. *Petala* 5, linearia, glabra, 6 mm. longa. *Stamina* 10, filamentis filiformibus, antheris oblongis. *Discus* tomentosus, obscure crenulatus. *Carpella* 5, ad basin connata. *Ovula* 5, pendula, cylindrico-canaliculata. *Stigma* capitatum, 5-lobum.

BORNEO. Sarawak: near Kuching, *Haviland* 2272.

A very distinct species in its small, stiff leaflets; hairy rhachis, petiolules and underside of midrib; the lax, short panicle; and short petals compared to the sepals.

XXV—CENTRAL AFRICAN CANOES.

In the *Kew Bulletin* 1931, 414, an account was given by Mr. C. M. Harris of the construction of canoes used by the natives on Lake Victoria, Uganda.

Now, through the courtesy of Mr. J. E. Hughes, for many years a resident in north-eastern Rhodesia, we have been privileged to extract from the mss. of his book ("Eighteen Years on Lake



Khaya nyasica Stapf. A, Flowering shoot with number of inflorescences removed ($\times \frac{1}{2}$); B, Flower ($\times 4$); C, Staminal tube ($\times 6$); D, Portion of same from inside ($\times 6$); E, Pistil ($\times 6$); F, Fruit ($\times \frac{1}{2}$); G, Seed ($\times \frac{3}{4}$).

Bangweolo," *The Field*, 1933) a description of the construction of the native dug-outs used on Lake Bangweolo, an extensive but very shallow lake in the heart of the Brachystegia country. Mr. Hughes forwarded to Kew leaflets, seeds and a small sample of the timber of the tree used for making the canoes, and known locally as "Mofu," and Mr. Hutchinson was able to identify these as belonging to *Khaya nyasica* Stapf, of the family *Meliaceae*. The genus *Khaya* produces some of the well-known West African Mahoganies, such as *K. anthotheca* C. DC., *K. grandifoliola* C. DC., *K. ivorensis* A. Chev., and *K. senegalensis* A. Juss. The last mentioned is perhaps now regarded as of the least economic importance, but it is the most closely allied to *K. nyasica* Stapf. *K. senegalensis* has a wide range in Northern Tropical Africa, occurring mostly in open woods by streams from the French Sudan in Upper Guinea to the French Cameroons, and extending through the Shari eastwards to the Sudan and Uganda. Its leaflets are oblong, usually acute and equal-sided at the base, mostly quite rounded at the apex, and somewhat rigidly leathery in texture in the dry state. *K. nyasica* occurs in the Katanga region of the Belgian Congo, through north-eastern Rhodesia, around Lake Nyasa and south to the Maseru district of Eastern Rhodesia. Its leaflets are from ovate to oblong, rounded and mostly very unequal-sided at the base, and always abruptly acuminate and thin in texture.

A black and white drawing of the species is given, and photographs by Mr. Hughes are reproduced showing the tree and construction of the canoes in various stages. Mr. Hughes' account has been condensed as follows :—

"The finest tree of the forest is the 'Mofu' (the plural of which is 'Myofu'). A good specimen usually has a trunk running straight upwards without branches, in some cases up to fifty feet high. The wood is cross-grained and pinkish when freshly cut, turning into a dark brown after a few days' sunshine. The bark is smooth, and the leaf and seeds are similar to those of an ash. Each seed has a vane for flying like that of the ash.

"The wood of the 'Mofu' is good timber, and is used for making the largest dug-out canoes. It is also very suitable for furniture. The Kyambi Mission of the White Fathers is almost entirely furnished with this wood, the trees being very plentiful in that neighbourhood where they are called 'Mwali.'

"The natives are very superstitious about this tree, and will not touch it, or even approach it, until a special 'Singanga' (Medicine Man) has been provided, to kill, with strong medicine, the evil spirit supposed to inhabit the tree. At an old village near Sokontwi there was on a high part of a plateau overlooking the Luapula a splendid solitary 'Mofu' towering above the forest, a landmark for miles. A gang of twenty men refused to approach it closely. I was desirous of converting it into a canoe. Incidentally, this tree was bristling with spears and arrows discharged at it from a distance, and left sticking

PLATE XII



" Mofu " tree, *Khaya nyasica* Stapf.



Natives cutting the trunk of the " Mofu " tree.



Turning over a half-hewn canoe.



"Miloki" canoe, a graceful native dug-out made from the "Mofu" tree.

in the bark all round the trunk. I took an axe and walked right round the tree, chopping into it here and there ; it did no good. All they said was that I should die in a few days, and departed to their villages to await the arrival of a Medicine Man. One can understand the superstitious fear these ignorant savages have of the magnificent ' Myofu.' They are very impressive, looking up from right under their branches they seem to scrape the clouds ; the swaying makes one feel quite dizzy. Fortunately, they will never become extinct, since those with crooked or forked trunks, being unsuitable for canoe-making, are left to propagate.

" It was not until I had obtained the services of a Medicine Man from the Lake, a plausible amusing scamp, but a good man at canoe making, that I got this fine tree dug up by the roots and fashioned into a very fine dug-out which was christened ' Nkolakalango ' after the Chieftainess, who is a relative of the Sokontwi (Ngomba). A second canoe was fashioned out of the arms and called ' Kaputula,' because for some reason or other it had to be cut off.

" The cutting of a really big canoe is quite a formidable, but at the same time, diverting undertaking. The whole thing is looked upon as a regular dry weather picnic.

" A circular trench is dug right round the tree, four or five feet away from the trunk, the roots being hacked through as the trench sinks until about 6-7 feet deep ; then an ominous crack, and a gentle leaning of the tree gives warning that the end is near.

" Now, all with the exception of one man—a volunteer and an expert—retire from the trench. He stands on the last root to be severed and then leaps out of danger as the grand tree sways forward to earth with a mighty crash, in which many of the great upper boughs are smashed.

" Five men were detailed to cut through the neck which stood fully 6 feet high (see photograph) and well above their heads, as will be seen. Others were detailed to chop away the massive roots, aiming to leave a blunt-pointed trunk which would eventually become the prow end of the canoe. All the rest of the gang were spread out along both sides, and on the top of the trunk, to cut away the bark and the soft white sapwood which in the case of the ' Mofu ' is almost negligible, the ' Mofu ' being practically all heart right to the bark.

" The hollowing out of the tree is all done by axes. ' Semba ' is the name of the axe as used for chopping. When the blade is put in crosswise it is called ' Mbaswa '—the ingenious native thus makes one tool do the whole job. Fire in any shape or form is not used in the process. Parallel transverse cuts about a foot apart are made, and then the wood between them is split out in large pieces. The sides and bottom of such a large canoe are left of great thickness, not less than 9 or 10 inches. Then the canoe is turned upside down and the work of shaping it is undertaken. The skilled men direct the others how to shape the sides and top, while they themselves carve out the prow and the stem, which is important work and not to be entrusted

to anyone else. The fashioning of the outside of the canoe is carried very nearly to completion, taking a week or ten days, during which the constant 'tappa-tappa-tappa-tap-tap' of the axes resounding on the hollow trunk now acting as a huge drum begins to get on one's nerves.

"When this work is completed no more can be done for at least six months—if cut thinner at this juncture the wood would warp and crack and the canoe would be spoiled. It has now to be turned upright again and must be kept filled with water during the seasoning period, whilst the sides are draped with grass or weeds to ward off the blaze of the sun.

"It is necessary to make arrangements with the nearest local headman to see that the canoe is kept filled with water up to the brim, for which a small payment is made.

"After sufficient seasoning the canoe is turned over again and the inside is more completely hollowed out. The Fundes gauge the thickness by putting one hand inside the canoe and the other on the outside opposite and clapping their two hands together with the wood between. Owing to long practice they are able to estimate the thickness of the wood with surprising accuracy.

"The canoe, although not yet completely finished, is ready to be dragged down to the nearest water, sometimes taking several days. The passage of a great dugout leaves a cleared road noticeable for a few years."

XXVI—NORTHEA HORNEI OR N. SEYCHELLANA.

T. A. SPRAGUE AND M. L. GREEN.

These two names were based on the same type-specimen, namely *Horne* 539. This was described by Baker (Fl. Maurit. & Seychelles, 194), in 1877, in the following words: "The *Capucin* of the Seychelles (*Horne*, 539), is probably a sixth unnamed species of this genus [*Sideroxylon*], but I have not seen flowers. It is a tree 50–60 feet high, with very stout conspicuously nodose branchlets, stout flattened petioles $\frac{1}{4}$ – $\frac{1}{2}$ in. long, oblong obtuse very thick coriaceous leaves 5–9 inches long glabrous and shining above, ferrugineo-puberulent below, with many close distinct veins (not more than $\frac{1}{12}$ in. apart), spreading from the costa nearly at a right angle and remaining visible to the edge."

Two years later, Hartog (Journ. Bot. 1879, 358), gave the name *Mimusops Hornei* to *Horne*'s specimen, but supplied no description: "I may here mention that a dissection of the very young buds on a specimen of the '*Capucine*' of the Seychelles prove it to be not a *Sideroxylon*, but a 3-merous *Mimusops*. As the petals were so young as to be still exstipulate, I could not determine the section. I name it, therefore, *M. Hornei*, after its collector, Mr. *Horne*, to whom systematic botany owes so many prizes. Full descriptions of the new species referred to in this paper will shortly be published in

the 'Journal'." Hartog, however, did not publish the promised description, and in 1884 the species was re-named *Northea seychellana*, gen. et sp. nov., by J. D. Hooker (Hook. Ic. Pl. t. 1473).

Hooker cited the name proposed by Hartog as "*Mimusops*? *Horneana* Hartog in Journ. Bot. 1879, 358 (name only)." Hartog, however, had published it as "*M. Hornei*," and expressed no doubt as to the genus.

In 1890, Pierre (Not. Bot. Sapot. 11), proposed the new combination *Northea Hornei* (Hartog) Pierre, based on *Mimusops Hornei*.

Engler (Engl. & Prantl, Nat. Pflanzenfam. iv. Abt. 1, 153: 1891), adopted the name *Northea seychellana* Hook. f., but subsequent authors, including Hemsley (Journ. Bot. 1916, 361), Diels (Beitr. Kenntn. Veg. Seych. 455: 1922) and Summerhayes (Trans. Linn. Soc., Zool. xix. 282: 1931), called it *N. Hornei*.

The question now arises which is the correct name, *N. seychellana* or *N. Hornei*. *Mimusops Hornei* Hartog appeared without a description: Hartog merely mentioned that it was 3-merous. A description of the same specimen (*Horne* 539), however, had been given previously by Baker (Fl. Maurit. & Seych. 194: 1877), who stated that it probably was a *Sideroxylon*. Hartog, however, did not refer to this description, nor can we find any evidence that he had seen it. It is not even certain that Hartog knew of Baker's Flora of Mauritius and the Seychelles. It is true that the last sentence of Hartog's paper (l.c. 359) dealing with stipules, contains a reference to observations on Sapotaceae by Baker: "Their presence varies from species to species in such natural genera as (*Eu-*) *Mimusops* and *Sideroxylon*, as noticed by Baker." This, however, cannot refer to Baker's flora, as there he (l.c. 191) describes the leaves of Sapotaceae as exstipulate. We have not been able to trace the reference.

Under the International Rules of Nomenclature, the name of a taxonomic group is not validly published unless it is accompanied by a description of the group, or by a reference to a previous description of it. Hartog neither described *Mimusops Hornei* nor referred to any previous description, hence the name *M. Hornei* was not validly published, and the species concerned should be called *Northea seychellana* Hook. f.

The spelling of the generic name (*Northea* or *Northia*) calls for notice. J. D. Hooker (Hook. Ic. Pl. xv. 57), spelled it with an "e" in the only two places in which it occurs in the text. On the plate (t. 1473), however, it was spelled with an "i." Otto Kuntze (Post & Kuntze, Lexic. 391: 1903) adopted the intrinsically preferable form *Northia*, but other authors accepted the original spelling *Northea*, which must be retained in the absence of proof that it was a typographic or an unintentional orthographic error.

XXVII—MISCELLANEOUS NOTE.

Boyce Thompson Southwestern Arboretum.—We have recently received an illustrated booklet describing the purpose, history and dedication of this Arboretum. It was founded and endowed by Colonel Boyce Thompson (the founder of the Institute for Plant Research at Yonkers) for the purpose of "bringing together and growing, for study and possible utilization, the plants of sub-arid climates, and of publishing the results of such investigations." The construction of the Arboretum was commenced in 1924, and Professor Franklin J. Crider, the present Director, took up his duties in the autumn of that year. In 1927 the Articles of Incorporation were signed, and in 1929, after the death of the founder, the dedication and official opening took place in the presence of a large gathering of botanists.

The Arboretum consists of about 1130 acres, situated near the town of Superior, Arizona. The most conspicuous features are Picket Post Mountain, 4400 feet, and two canyons traversing the grounds from east to west. There is a great variety of exposures and soils, "the whole supporting a great diversity of native vegetation and furnishing an especially interesting and favourable natural setting for the institution."

There are two large structures for the propagation of plants, built in 1925, and an Administration Building, including offices, laboratories, herbarium, library and other rooms, which was erected in 1926. In 1928 the founder gave his winter home, Picket Post House, to the Arboretum for the use of Students as living quarters. The Arboretum, therefore, is very well equipped for both cultural work and study in the herbarium and laboratory, and, by reason of its situation in an exceedingly dry climate, enjoys together with the Desert Laboratory of the Carnegie Institution of Washington at Tucson, exceptional opportunities for the study of the vegetation of sub-arid regions.

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